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MICHAEL RODAK, JR.

No. 73-1480

In the

Supreme Court of the United States

October Term, 1973

DONALD M. UMPHREY and
DOUGLAS J. MARSDEN,

Petitioners,

vs.

McGRAW-EDISON COMPANY,

Respondent.

PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT

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PETITION FOR A WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE SEVENTH CIRCUIT

Donald M. Umphrey and Douglas J. Marsden, plaintiffs-appellees in the court below, pray that a writ of certiorari issue to review the judgment order of the United States Court of Appeals for the Seventh Circuit in the above-entitled cause.

OPINIONS BELOW

The unreported opinion, findings of fact and conclusions of law of the District Court are printed in the Appendix

hereto (B6-14).* The unpublished judgment order of the Court of Appeals is also reproduced in the Appendix hereto (B16-27).

JURISDICTION

The judgment of the Court of Appeals was entered in that Court's order, dated December 14, 1973 (*ibid.*). Plaintiffs' petition for rehearing was denied January 14, 1974 (B28).

The jurisdiction of this Court is invoked under 28 U.S.C. § 1254(1).

QUESTIONS PRESENTED

1. Whether a Court of Appeals, while admitting the novelty of the patented concept in suit, may circumvent the Constitutional purpose of Article I, Section 8, clause 8, "to promote the progress of science and useful arts," by making a narrow interpretation of the patent claims without suggesting any support in the prior art for so doing and contrary to a clearly expressed understanding between the inventor and his licensee when they executed the license agreement in suit?

2. Whether a Court of Appeals can change the scope of an inventor's protection by departing from the rule of law, consistently adhered to by this Court, that the incorporation of the inventor's concept in an accused device is an infringement of the patent claims even though the accused device also incorporates one or more additional elements, *e.g.*, *Cochrane* v. *Deener*, 94 U.S. 780, 787 (1876),

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* As used herein, page numbers preceded by "B" refer to the attached Appendix. Page numbers preceded by "A" refer to the Appendix to the Briefs filed in the Court of Appeals and certified to this Court.

Cantrell v. *Wallick*, 117 U.S. 689, 694 (1886), *Temco Electric Motor Co.* v. *Apco Mfg. Co.*, 275 U.S. 319, 328 (1928), and *United States* v. *Line Material Co.*, 333 U.S. 287, 291 (1948)?

3. Whether a Court of Appeals can change the scope of an inventor's protection by departing from the rule of law, consistently adhered to by this Court, that it is the claims of the patent which determine the scope of his protection, *e.g.*, *Machine Co.* v. *Murphy*, 97 U.S. 120, 125 (1877), *Continental Paper Bag Company* v. *Eastern Paper Bag Company*, 210 U.S. 405, 418-419 (1908), *Smith* v. *Snow*, 294 U.S. 1, 11 (1935), and *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 339 U.S. 605, 608-609 (1950)?

4. Whether a Court of Appeals may properly reverse a judgment of patent infringement despite the District Court's specific findings of fact, made pursuant to Rule 52(a), Fed. R. Civ. P., that the patented and accused devices are structurally, functionally and operationally identical in incorporating the inventor's novel concept, and despite this Court's directions in *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 336 U.S. 271, 274-275 (1949) concerning the emphasis to be given to the District Court's findings of fact?

5. Whether it is proper for a Court of Appeals to substitute its assumptions for the District Court's fact findings concerning the scope of the patent claims in suit, instead of remanding the cause for any further findings deemed necessary, *cf.*, *Graham* v. *John Deere Co.*, 383 U.S. 1, 17 (1966)?

CONSTITUTIONAL PROVISION, STATUTES AND RULES INVOLVED

This case involves Article I, Section 8, clause 8, of the Constitution of the United States, 35 U.S.C. §§ 102(a), 103, 112 and 154, Supreme Court Rule 19(1) (b), and Rule 52(a), Fed. R. Civ. P. (all printed in pertinent part at B1-3).

STATEMENT OF THE CASE

Petitioners, Donald M. Umphrey (an inventor sometimes hereinafter referred to as "plaintiff"), and Douglas J. Marsden, his assistant, sued respondent, McGraw-Edison Company (sometimes hereinafter referred to as "defendant"), on a contract (A11-14). Diversity and the requisite jurisdictional amount were alleged and undisputed. The District Court held defendant liable for the payment of certain patent royalties due under the contract. However, the Court of Appeals held that the defendant's accused devices did not infringe the patent claims, and accordingly reversed the judgment of the District Court. A timely petition for rehearing was denied in the Court of Appeals, thus giving rise to the instant petition for a writ of certiorari.

The contract in suit incorporates by reference a patent application which Umphrey had filed in the United States Patent Office and disclosed to the defendant prior to execution of the contract. Under that agreement Umphrey granted an exclusive license to defendant under the patent application and any patents eventuating therefrom. If royalties surpassed $50,000, the royalty rate was to drop from 5% to an even more nominal 2% of the net selling price of all equipment embodying the teachings and claims of the patent application. The formal agreement embodied

the earlier negotiations of the parties which expressly stated that the royalty applies (A648):

> ". . . when the interrupter feature, for which the patent application applies, is used."

Umphrey's patent application matured into a United States patent entitled "High Tension Oil Switch," No. 2,909,633 (A347-356).

The District Court summarized the context of the Umphrey invention as follows (B7):

> "The circuit breakers involved (also referred to as high tension oil switches) are electrical switches designed to create a path for or interrupt the flow of electrical current. They are designed generally for use by public utilities in conjunction with the transmission of electrical current at extremely high voltages."

An important element or feature of such circuit breakers is the combination of parts which function to break an electrical circuit when a fault occurs in the circuit (such as a short circuit caused by a tree limb falling over high tension transmission lines, or the breaking of such lines due to heavy icing during the wintertime). The Court of Appeals, in examining the claims of the Umphrey patent in suit, referred, *inter alia*, to the structural portions of Umphrey's invention which interrupt the various types of fault currents, such as those just referred to, stating (B18):

> "The element which is critical in this action is element (*c*) in Claim 1, an identical element in Claim 2, and corresponding, but differing, portions of Claims 6 and 7. The corresponding portion of Claim 6 reads:
>
> > 'an interrupter structure substantially surrounding the space between said contacts as they move

> apart, said structure being provided with an exhaust port having an inner end and an outer end, said inner end opening directly into said space, a nozzle facing said outer end . . .'"

Paraphrasing the patent, the Umphrey invention relates to a combination of parts which include a fixed electrical contact and a movable electrical contact. When a fault occurs on the high tension transmission line, the movable contact separates from the fixed contact, thus forming an electrical arc. The path through which the movable contact travels is called an arc path and is located down through the center of a set of baffle plates. The entire set of contacts and the baffles surrounding the arc path are immersed in oil. When an arc is formed, the oil in and surrounding the arc path is vaporized, thus releasing tremendous amounts of heat, pressure and arc combustion products in the vicinity of the arc. At least one exhaust port is provided in the assembly of baffle plates so that the pressure and combustion products may escape from the arc path. Facing the exhaust port is a nozzle attached to a pump so that a jet of oil may be directed across an unconfined space at the escaping exhaust products.

Both the District Court and the Court of Appeals recognized the concept protected by Umphrey's patent and referred to by him at the trial as (B41):

> "A stream of oil being projected through a relatively vented region into the exhaust port of an arc chamber."

However, the Court of Appeals seems to have ignored evidence of direct copying which is universally significant in a patent case.

For example, the initial preparation of defendant's sales catalog demonstrates that the defendant copied the description of its accused circuit breakers *verbatim* from the Umphrey patent:

Defendant's catalog draft (A609-610)	Umphrey patent, column 3, lines 28-31, 31-36, 39-44 and 45-48 (A350)
"1. Maintain in arc path operative conditions that change from instant to instant so as to best break the arc and prevent its restriking, irrespective of the nature of the circuit broken.	". . . maintain in the arc path operative conditions that change from instant to instant so as best to break the arc and prevent its restriking, irrespective of the nature of the circuit broken, . . ."
"2. Provide means for relieving excessive pressures within the interrupters under abnormal conditions of operations. Such means to be of a type that will not lead to the formation of a region of less-than-atmospheric pressure in the interrupter.	". . . provide means for relieving excessive pressures within the interrupter under abnormal conditions of operation . . . relief means of a type that will not lead to the formation of a region of less-than-atmospheric pressure . . ."

Defendant's catalog draft (A609-610)	Umphrey patent, column 3, lines 28-31, 31-36, 39-44 and 45-48 (A350)
"3. Provide a means of cooling and condensing the arc-formed gases that does not result in raising materially the resistance of the arc during periods of maximum current but that is effective in cooling and deionizing the zero point in the a.c. cycle.	". . . provide a means of cooling and condensing the arc-formed gases that does not result in raising materially the resistance of the arc during periods of maximum current but that is effective in cooling and deionizing . . . the zero points in the alternating current cycle, . . ."
"4. Provide means for driving the condensing oil that is independent of the intensity of the arc and is ready for instant operation as soon as the switch contacts start to separate."	". . . provide means for driving the condensing oil that is independent of the intensity of the arc, and . . . is ready for instant operation as soon as the switch contacts start to separate . . ."

Also, the internal memoranda of the defendant show that the copying demonstrated above was unquestionably intentional (A639):

> "We are now in a position where we must print literature on the HF-36 and prepare our literature for the AHJ-54. It is my understanding that we can proceed with the HF-36 material, **attempting to avoid direct quotations from any patents which D. M. Umphrey has** on his minimum oil breaker. It is also

my understanding that we are to wait on any promotion literature for the AHJ-54 until we get a better reading from our legal department.

". . . and if there is some way in which you can give me the complete leeway to promote both these breakers without any limitations, it would be advantageous. **We really have something to sell with our external oil pump, and I would like to make the most of it."***

The instant petition for certiorari is being filed in the belief that a resolution of the foregoing five questions presented will be of universal benefit in clarifying issues of patent law. The United States patent system surely has been one of the pillars of strength and growth of this country, but it is impossible for our patent system to continue to be a strong and viable incentive to technological development when, as here, an appellate court fails to observe the Constitutional and statutory grounds upon which it is founded.

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* Emphasis in quotations is added throughout this petition unless otherwise noted.

REASONS FOR GRANTING THE WRIT

1.

This is a relatively simple patent case, and yet it contains issues of universal importance in applying the patent laws "to promote," in accordance with the Constitutional mandate, "the progress of science and useful arts."

The Umphrey concept was clearly and fully described in his patent application as filed, and it is defined by the claims of his issued patent. The Court of Appeals agreed with the District Court in holding (B25):

> "It is clear that the **invention protected by the patent** is the use, in combination with several recognized and individually unpatentable elements of arc interrupters, of the concept of projecting a stream of oil across an essentially unconfined space and against an exhaust port."

Claims 1 and 2 here in suit issued from the Patent Office in the same form as they were originally submitted (see the complete file of the application proceedings, A362-431, especially at 395-397), thus forming a part of the inventor's original disclosure, both to the Patent Office and to the defendant when the license agreement in suit was signed. Neither the Patent Office, nor the District Court (B12), nor the Court of Appeals found any prior art to anticipate Umphrey's novel concept.

The Court of Appeals expressly held (B21):

> "The prior art does not appear to have included the Umphrey concept of projecting a stream of oil across an essentially unconfined space, aimed at an exhaust port, in an interrupter structure, the port leading from the arc chamber, so that the jet impelled

> oil will enter the port only when the jet applies more pressure than exists in the arc chamber."

In the same breath the Court of Appeals also confirmed the District Court's holding that the Umphrey patented concept is present in the defendant's accused circuit breakers (*ibid.*):

> **"This concept is present in the accused devices,** although it is clear that in them there are ports, leading from the arc chamber into unconfined space, into which no jet of oil is projected."

These observations by the Court of Appeals recognize what the Umphrey concept is, that it is not shown in the prior art, that it is protected by his patent and that it is present in the defendant's accused devices.

Nevertheless, the Court of Appeals held that the defendant's circuit breakers utilizing the Umphrey concept do not infringe.

The ultimate dilemma in which the Court of Appeals' decision leaves an individual inventor is this: His invention has been disclosed and covered by a patent obtained in accordance with the patent laws of this country, and he has granted an exclusive license to a very large company which has used the inventive concept successfully and widely; now that his claim for the agreed royalties has been rejected, why did he bother expending his time, energy and money on the invention for so many years? Rephrased, the question might be: Of what value is a patent? Manifestly, when individual inventors whose inventions are meritorious find themselves asking these questions, the "progress of science and useful arts" has not been promoted. The patents which such inventors have been granted in return for their public disclosures

are frustrations of the statutory command (35 U.S.C. § 154, see B2) that "Every patent shall . . . grant to the patentee . . . the right to exclude others from making, using or selling the invention . . . ."

It is undisputed that the license agreement in suit was prepared by defendant's patent counsel. The defendant is certainly no stranger to the field of patents or to license agreements under them. It is inconceivable that defendant could have had any misunderstanding of the scope of the concept covered by the claims in the Umphrey patent application, since it had that patent application in its possession when the license was executed (B42).

Just how good is Umphrey's invention? The testimony of defendant's expert, Linde, fully answers this question. Defendant offered in evidence a report of a series of tests which it performed on one of its own accused model HF-36 circuit breakers (A497-499). This breaker has a port unopposed by a nozzle (which the Court of Appeals considered to be a "material departure from the combination claimed," B27) as well as a port faced by a nozzle delivering a jet of fluid from a pump. Linde testified that this circuit breaker failed on several occasions to interrupt an arc when the pump driving the stream of oil was deactivated but never failed when the pump was placed in operation.*

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* Linde deposition, pp. 178-181:

"Q. Under what conditions did the restrikes occur?

• • •

"A. The restrikes occurred with the pump deactivated.

• • •

"Q. Yes. Now, I believe there is a question pending which I will restate, to save referring back, as to whether any restrikes or re-ignitions occurred in

Manifestly, the defendant's own tests and the testimony of its own expert conclusively establish (1) when the Umphrey concept was used, the defendant's circuit breaker worked, (2) when the concept was not used, the accused device was a failure, and (3) **the presence of an additional but unopposed port in the accused device was an immaterial factor in this respect.**

The Court of Appeals in this case has disregarded the Constitutional provision and the patent laws by giving the defendant a reward for appropriating the Umphrey invention while penalizing the inventor for making his invention known to the public.

2.

The Court of Appeals held that the defendant's addition of an exhaust port without a corresponding jet in the interrupter structure of the accused circuit breaker was not contemplated by the Umphrey patent claims. This conclusion ignores Umphrey's disclosure to his patent attorney in October 1956, before the patent application was filed, that (A552):

> ". . . one or more supply nozzles per exhaust passage may be applied and there may be several exhaust passages, **all or part of which may be equipped with oil supply nozzles.**"

In accordance with this disclosure, all of the Umphrey patent claims (B4-5), including claims 1 and 2 which were part of the original disclosure to the Patent Office, simply call for "at least one port" or "a port" facing a nozzle,

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* (Continued)

the tests reported on Defendant's Exhibit 60, when the pump was being used.

* * *

"A. There are none shown."

but they do not, by any grammatical construction, exclude structures in which there are other ports without nozzles opposite them.

The Court of Appeals erroneously reasoned that certain references in the Umphrey patent specification to maintenance of pressure conditions within the arc chamber of Umphrey's interrupter compel the conclusion that additional ports without jets aimed at them would be a material departure from the structure defined by the patent claims. The Court of Appeals failed to note that the defendant's devices also obtain maintenance of proper pressure conditions within the arc chamber by using an oil jet directed at an exhaust port, even when an unopposed exhaust port is added (e.g., *ante*, pp. 7-8).

There is no dispute in this case as to whether the defendant's provision of an additional exhaust port unopposed by a jet in the interrupters of the accused circuit breakers is or is not an improvement over the Umphrey construction. What the Court of Appeals seems not to have appreciated is the evidentiary basis* for the

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* Tremendous pressures are created in the arc path when an arc is formed, and this is true in the accused devices, as defendant's counsel stated in his opening statement at the trial (B41). Defendant's trial expert, W. J. Smith, substantiated counsel's statement when he testified, with respect to the accused devices (B47): "Pretty obviously, the larger the value of current interrupted, the higher the pressure will go. . . ." Smith testified extensively and specifically that the difference between the impact pressure of the jet at the port and the enormous pressure inside the arc chamber would make it impossible under most conditions when an arc was present for a jet to even begin to enter the arc chamber, much less pass through it to achieve the "cross-venting" which the Court of Appeals believed to be a material departure from the Umphrey claims (see,

District Court's implicit finding that the function of the additional, but unopposed, port in the accused devices had no material effect upon the maintenance of pressure conditions in the arc path.

Even assuming, *arguendo*, that the addition of an unopposed exhaust port may improve the operation of the accused circuit breakers (and there is no evidence that it does), it has long been the law that an improver may not appropriate another person's invention. In *Temco Electric Motor Company* v. *Apco Manufacturing Company*, 275 U.S. 319, 328 (1928), this Court unequivocally stated:

> "It is well established that an improver can not appropriate the basic patent of another and that the improver without a license is an infringer and may be sued as such. *Cochrane* v. *Deener*, 94 U.S. 780, 787; *Cantrell* v. *Wallick*, 117 U.S. 689, 694; *Yancey* v. *Enright*, 230 Fed. 641, 647; *Reed* v. *Hughes Tool Company*, 261 Fed. 192, 194."

This Court relied upon the above-quoted principle in *United States* v. *Line Material Co.*, 333 U.S. 287 (1948), and the principle is still being followed, *e.g.*, *Noll* v. *O. M. Scott & Sons Company*, 467 F.2d 295, 301 (6 Cir. 1972).

If the present decision is allowed to stand, even as an unpublished order by rule of the Court of Appeals, it will encourage further deviation from the supreme law of the land consistently adhered to by this Court.

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* (Continued)

e.g., B48-53). Smith also testified that the defendant's own literature describing the operation of its circuit breaker was defendant's "best interpretation of how the interrupter works" (B52), and this literature explicitly states that the jet does not go through the interrupter until after arcing stops (A622).

3.

Never once did the Court of Appeals say how or why the unopposed port caused the defendant's circuit breakers to operate so differently as to avoid infringement. Despite the plain language of the patent claims to the contrary, the Court of Appeals simply held that the Umphrey invention had to have every exhaust port opposed by a jet. This holding not only nullified the language of the claims but also (1) abrogated the purpose of the description in the patent specification of Umphrey's preferred embodiment of his invention, which followed the requirements of 35 U.S.C. § 112 (B2); and (2) ignored the District Court's factual determinations on the infringement issues and the evidence in support thereof.

The critical issue here is whether, in a circuit breaker embodying Umphrey's invention, there **can be** a port in the interrupter unopposed by a jet-forming nozzle, or whether, as held by the Court of Appeals, there **must not be** a port unopposed by such a nozzle. There are numerous passages in the specification and claims of the patent which contradict the Court of Appeals' conclusion, among which are at least three that are readily understandable even to someone not scientifically trained.

When plaintiffs' expert, Harrington, was asked by defendant's counsel to point out any reference in the patent to exhaust ports being unopposed by a nozzle, he responded (B35):

> "A I interpret the teachings that there can be, but not that it says that there must be.
>
> • • • •
>
> "A I am perhaps basing my interpretation of the teachings on column 12, beginning on line 7, where it says:
>
> " 'The interrupter structure can be modified as to shape and direction of the various passages within it.

> The foregoing description and drawings are therefore intended to be merely illustrative, and the scope of the invention defined by the following claims . . . .' "*

Umphrey pointed out that his patent drawing illustrated a situation in which the oil from the jet could enter one side of the arc chamber and exit out of the other side (B31-32):

> "A In Figure 7 [see A348] it is conceivable that under agitation in the arc column 41 that a considerable portion of the oil from the vents on the right-hand nozzzles, or from the nozzles on the right-hand side, could go into the arc chamber, and if there was not an arc there, it could cross and a great deal of it could go out of the left-hand vent."

Most significantly, the patent claims themselves show that the Umphrey invention can be used in a circuit breaker interrupter having ports without nozzles aimed at them. The patent claims (B4-5) only call for "at least" one port or "an exhaust port" faced by a nozzle, and the Court of Appeals acknowledged that this claim language "does not compel the construction that every port must be the target of a stream from a nozzle" (B24).

Thus, both the testimony and the patent belie the Court of Appeals' conclusion that the Umphrey invention must not include an exhaust port unopposed by a jet of oil.**

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* Harrington further testified that, if an arc were present, the jet would ordinarily not go out of an unopposed port due to the pressure created inside the arc chamber (B37-38).

** The Court of Appeals was also apparently influenced by the Patent Office proceedings which led to the issuance of the Umphrey patent (B24-25) but could find no

If the present decision is allowed to stand, it will be in direct conflict with the decisions of this Court and numerous other courts which, pursuant to 35 U.S.C. § 112, only require an inventor to set forth the preferred embodiment of his invention in his patent specification and do not limit his patent claims to the precise form of the preferred embodiment. *Continental Paper Bag Company* v. *Eastern Paper Bag Company*, 210 U.S. 405, 418-419 (1908), holds:

> "We think it is clear that the court considered that Liddell sought to comply with § 4888 [a predecessor of 35 U.S.C. § 112] of the Revised Statutes. In other words, he filed a description of his invention, explained its principle and the best mode in which he 'contemplated applying that principle,' and did not intend to give up all other modes of application. An inventor must describe what he conceives to be the best mode, but he is not confined to that. *If this were not so most patents would be of little worth.* 'The principle of the invention is a unit, and invariably the modes of its embodiment in a concrete invention may be numerous and in appearance very different from each other.' Robinson on Patents, § 485. The invention, of course, must be described and the mode of putting it to practical use, but the claims measure the invention. . . ."

** (Continued)
estoppel based upon those proceedings. The Court of Appeals' reliance upon the arguments in the Patent Office is obviously tenuous, because (1) none of Umphrey's claims was ever changed to avoid prior art (A362-431), and (2) the Patent Office itself withdrew its own suggestion that Umphrey adopt the Patent Office's wording of a suggested claim which called for an "arc-quenching stream of oil" (A415) to be driven across a live arc.

The universality of properly applying § 112, in the manner demonstrated by the foregoing quotation, was recently summarized and emphasized in *The Duplan Corporation et al.* v. *Deering Milliken, Inc. et al.*, ... F. Supp. .....; 180 U.S.P.Q. 373, 375 (D. So. Car. 1973):

> "See 35 U.S.C. § 112, infra. The appellate courts have consistently held that the claims of a patent, and not the specifications, measure the invention. *Minnesota Mining and Manufacturing Co.*, v. *Kent Industries, Inc.*, 409 F.2d 99, 101, 161 USPQ 321, 322-323 (6th Cir. 1969) (citing *Milcor Steel Co.* v. *George A. Fuller Co.*, 316 U.S. 143, 86 L.ed. 1332, 53 USPQ 268 (1942)); *Ohio Citizens Trust Co.* v. *Lear Jet Corp.*, 403 F.2d 956, 958, 160 USPQ 11, 13 (10th Cir. 1968). *Bros Inc.* v. *W. E. Grace Mfg. Co.*, 351 F.2d 208, 213, 147 USPQ 1, 4-5 (5th Cir. 1965) states: 'For while the specification of the patent is indeed important, it must conclude with the claim and we, and all other courts, have often held that it is the claim of a patent that measures the invention so much so that each is (and must be) separable and distinct, each defining in effect a separate invention and each treated in law as a separate grant.'"

The decision in the present case will place an impossible burden upon inventors and their patent solicitors to comply with § 112 by anticipating, purely on the basis of their imagination, all possible forms of an infringer's attempted avoidance of a patent claim. In addition, the expense and effort which will necessarily be expended by the already overburdened Patent Office in examining vastly expanded patent applications will be horrendous.

The words of this Court in *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 339 U.S. 605, 607 (1950), were never so appropriate:

> "But courts have also recognized that to permit imitation of a patented invention which does not

copy every literal detail would be to convert the protection of the patent grant into a hollow and useless thing. . . . One who seeks to pirate an invention . . . may be expected to introduce minor variations to conceal and shelter the piracy. Outright and forthright duplication is a dull and very rare type of infringement. To prohibit no other would place the inventor at the mercy of verbalism and would be subordinating substance to form."

4.

The decision of the Court of Appeals directly and grievously contradicts the mandate of Rule 52(a), Fed. R.Civ.P. (B3), in concluding that a material difference existed between the language of Umphrey's patent claims and the defendant's accused circuit breakers (B27). Although professing to be deciding a matter of law, the Court of Appeals based its decision upon purely factual matters (*ibid.*):

"We think the emphasis on turbulence and maintenance of pressure within the arc chamber indicates that the provision of additional ports at which no streams of oil are aimed was not contemplated and is a material departure from the combination claimed."

The quoted statement could not have been made without totally disregarding the facts found by the District Court. That court, too, considered the effect of turbulence and pressure in an arc chamber having a plurality of exhaust ports, not all of which were opposed by oil jets (B9):

"A final aspect of the problems created in connection with high voltage current interruptions arises out of the fact that circuit breakers must be designed to function within a wide range of voltage loads. This necessitates a design capable of containing and dissipating the large volume of gas generated

by a high current interruption to avoid tank explosions and fires. But the ports and vents required to achieve this capability are excessive in the instance of low current interruptions where it is desirable to contain a certain degree of pressure and turbulence in the interrupter chamber, a condition thwarted by the larger venting areas necessary to high current switching."

The District Court had the benefit of observing the testimony given in open court by the inventor, Umphrey (B43-44), and by defendant's expert, W. J. Smith (B46-53). The District Court also had before it, and heard testimony directed to, defendant's own models of the accused circuit breakers which were physical exhibits at the trial. In view of this testimony and other evidence the District Court found as a fact that the defendant's accused circuit breakers did provide, by using Umphrey's concept, means for varying the venting areas of the interrupter to maintain pressure in the arc path responsive to all fault current levels (B12):

"Under low current conditions, the oil jet in each of the accused breakers is designed to close off the port at which it is directed, while at high current values the exhaust pressure forces back the oil jet. The oil jet condenses the exhaust gases as they escape into the unconfined body of oil between the nozzle and the exhaust port. When arcing stops, the oil jet is forced through the shell and out the opposite exhaust port, flushing out arc products and assuring fast dielectric recovery strength of the arc path. This system of arc interruption is designed to provide fast, efficient interruption of both high and low current level faults and to make possible reliable high speed reclosing of the breakers.

"The accused circuit breakers and the circuit breaker described and claimed in the '633 patent

> **are organizationally and functionally identical** in achieving interruption of both high and low current arcs. In the accused breakers the high velocity jet is projected across an unconfined intervening space between the nozzle orifice and an exhaust port from the shell. At that port, the kinetic or velocity energy of the jet is converted back to that of pressure in order to maintain a pressure in the arc path responsive to all fault current levels. This is precisely the function and organization of structural elements taught by the '633 patent."

An appellate court is without any authority to set aside fact findings which are not clearly erroneous. In the instant case not a single finding of the District Court was determined to be erroneous in any respect. Manifestly, the decision of the Court of Appeals is a serious departure from the holding in *Graver Tank & Mfg. Co.* v. *Linde Air Products Co.*, 336 U.S. 271, 274-275 (1949):

> "Rule 52(a) of the Federal Rules of Civil Procedure provides in part: 'Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses.' To no type of case is this last clause more appropriately applicable than to the one before us, where the evidence is largely the testimony of experts as to which a trial court may be enlightened by scientific demonstrations.
>
> • • •
>
> "The rule requires that an appellate court make allowance for the advantages possessed by the trial court in appraising the significance of conflicting testimony and reverse only 'clearly erroneous' findings."

Unless the decision of the Seventh Circuit Court of Appeals in the present case is reversed, it will not only abridge the holding of the *Graver* case, but also will

be in direct conflict with the holdings in *Smith* v. *James Irvine Foundation*, 402 F.2d 772, 774 (9 Cir. 1968), *Sta-Rite Industries, Inc.* v. *Johnson*, 453 F.2d 1192, 1194 (10 Cir. 1971), and *Ramirez* v. *Perez*, 440 F.2d 1072 (5 Cir. 1971). In the last-cited case the court pithily stated:

> "No class of cases known in the law can be said to be as uniquely fact-oriented as those involving patents. Trial court fact determinations are the *sine qua non* of accurate appellate review."

5.

The District Court clearly understood what the Umphrey invention was, and fully but generally discussed the prior art. It also considered the differences between the prior art and Umphrey's patented concept which both courts below found to be novel. There was no dispute in either court concerning the degree of skill possessed by those persons skilled in the circuit breaker art. While the District Court held the Umphrey claims in suit valid, the Court of Appeals avoided requiring the District Court to further evaluate those claims against the standards of 35 U.S.C. § 103 (B1-2). Instead, the Court of Appeals focused its attention almost entirely upon only one embodiment of the invention in the patent specification, and gave the Umphrey claims practically no scope at all.

This injustice is the shocking result of the Court of Appeals' substitution of its assumptions for the District Court's findings of fact. Even a first reading of the appellate court's judgment order demonstrates that it is replete with numerous misapprehensions concerning the operation of Umphrey's circuit breaker invention, *e.g.*:

> "Differences between the accused devices and the claims, *arguably existing and significant*, are: . . ."

[B22]; "Although the language of Claim 6 *does not so clearly require* the nozzle to be a part of the interrupter structure, and Claim 7 *does not so clearly require* both nozzle and exhaust passage to be parts thereof, such construction *is at least reasonable*" [B23]; "*It is at least a reasonable construction of the claims* that there is to be an opposing nozzle for each port" [B23]; "*Assuming the construction of the claims above indicated, i.e.,* that there is no port which is not the target of a stream of oil, . . ." [B24]; ". . . his disclaimer *at least tends strongly to support the construction* that the impelling of oil transversely across the arc was excluded from any combination he claimed" [B25]; "We have already indicated several respects in which the *interpretation of claim language leads to this conclusion.* . . . Although the other claims lack that expression, several portions of the specification *indicate* that the maintenance of such pressure, *presumably by having a stream under such pressure directed at every port,* is significant" [B26]; "*We think the emphasis* on turbulence and maintenance of pressure within the arc chamber *indicates that* the provision of additional ports at which no streams of oil are aimed was not contemplated . . ." [B27].

These critical assumptions should never have been made. Instead, such an obviously substantial number of factual questions as appeared to exist for the appellate court should have caused that Court to remand the case to the District Court for further findings of fact.

The principles of making proper fact findings in patent cases, so strongly expressed in *Graham* v. *John Deere Co.*, 383 U.S. 1, 17 (1966), are as applicable in infringement determinations as they are in validity determinations. Those principles are completely frustrated when an appellate court, in doubt as to the actual facts, resorts to guesswork.

CONCLUSION

For the foregoing reasons, this petition for a writ of certiorari should be granted.

Respectfully submitted,

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APPENDIX

APPENDIX

CONSTITUTIONAL PROVISION INVOLVED

Article I, Section 8, Clause 8

Section 8. The Congress shall have Power. . . .

• • •

To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries;

STATUTES INVOLVED

35 U.S.C. § 102(a)

§ 102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent. . . .

• • •

35 U.S.C. § 103

§ 103. Conditions for patentability; non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter per-

tains. Patentability shall not be negatived by the manner in which the invention was made. July 19, 1952, c. 950, § 1, 66 Stat. 798.

35 U.S.C. § 112

§ 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention. A claim may be written in independent or dependent form, and if in dependent form, it shall be construed to include all the limitations of the claim incorporated by reference into the dependent claim. As amended July 24, 1965, Pub.L. 89-83, § 9, 79 Stat. 261.

• • •

35 U.S.C. § 154

§ 154. Contents and term of patent

Every patent shall contain a short title of the invention and a grant to the patentee, his heirs or assigns, for the term of seventeen years, subject to the payment of issue fees as provided for in this title, of the right to exclude others from making, using, or selling the invention throughout the United States, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent and be a part thereof. As amended July 24, 1965, Pub.L. 89-83, § 5, 79 Stat. 261.

RULES INVOLVED

Supreme Court Rule 19(1)(b)

Rule 19. Considerations governing review on certiorari

1. A review on writ of certiorari is not a matter of right, but of sound judicial discretion, and will be granted only where there are special and important reasons therefor. The following, while neither controlling nor fully measuring the court's discretion, indicate the character of reasons which will be considered:

• • •

(b) Where a court of appeals has rendered a decision in conflict with the decision of another court of appeals on the same matter; . . . or has decided an important question of federal law which has not been, but should be, settled by this court; or has decided a federal question in a way in conflict with applicable decisions of this court; or has so far departed from the accepted and usual course of judicial proceedings, or so far sanctioned such a departure by a lower court, as to call for an exercise of this court's power of supervision.

Rule 52(a), Fed.R.Civ.P.

Rule 52. Findings by the Court

(a) Effect. In all actions tried upon the facts without a jury or with an advisory jury, the court shall find the facts specially and state separately its conclusions of law thereon, and judgment shall be entered pursuant to Rule 58; and in granting or refusing interlocutory injunctions the court shall similarly set forth the findings of fact and conclusions of law which constitute the grounds of its action. Requests for findings are not necessary for purposes of review. Findings of fact shall not be set aside unless clearly erroneous, and due regard shall be given to the opportunity of the trial court to judge of the credibility of the witnesses. . . . If an opinion or memorandum of decision is filed, it will be sufficient if the findings of fact and conclusions of law appear therein. . . .

CLAIMS OF UNITED STATES LETTERS PATENT NO. 2,909,633 IN SUIT

Claims 1, 2, 6 and 7:

1. A high-tension electrical switch comprising the combination of elements designated as elements (*a*) to (*d*) and defined as follows: element (*a*), a pair of relatively movable contact members adapted to be closed to complete a circuit and separated to form an arc-path therebetween; element (*b*), means for moving at least one of said contacts to bring the pair thereof alternatively into their closed and separated positions; element (*c*), an interrupter structure closely surrounding said arc-path and having formed therein an exhaust passage, at least one port connecting from said arc-path into said exhaust passage and a nozzle adapted to direct a jet of fluid into said port in a direction counter to flow of fluid from said arc-path into said exhaust passage; and element (*d*), pumping means connected to operate concurrently with element (b) to force a jet of fluid through the nozzle of element (*c*) as the contacts of element (*a*) are separating.

2. A high-tension electrical switch comprising the combination of elements designated as elements (*a*) to (*e*) and defined as follows: element (*a*), a pair of relatively movable contact members adapted to be closed to complete a circuit and separated to form an arc-path therebetween; element (*b*), a spring connected to separate said contacts; element (*c*), contact-moving means connected to close said contacts against the action of said spring; element (*d*), an interrupter structure closely surrounding said arc-path and having formed therein an exhaust passage, at least one port connecting from said arc-path into said exhaust passage and a nozzle adapted to direct a jet of fluid into said port in a direction counter to flow of fluid from said arc-path into said exhaust passage; and element (*e*), a pump comprising a piston operative by relaxation of element (*b*) to force a jet of fluid through said nozzle of element (*d*).

6. An electric switch comprising a pair of separable contacts movable together and apart, selectively, for making and breaking an electric circuit, an interrupter structure substantially surrounding the space between said contacts as they move apart, said structure being provided with an exhaust port having an inner end and an outer end, said inner end opening directly into said space, a nozzle facing said outer end, and means forcing a continuous stream of fluid through said nozzle toward said exhaust port as said contacts separate.

7. An oil circuit breaker comprising a pair of separable contacts, an interrupter structure defining an arc chamber between said contacts as they separate, an exhaust passage, and an exhaust port connecting said chamber to said passage, a nozzle opening into said exhaust passage opposite and facing said exhaust port, and means forcing a stream of oil through said nozzle toward said port as said contacts separate, whereby the pressure in said chamber is maintained substantially at the impact pressure of said stream of oil.

IN THE UNITED STATES DISTRICT COURT
For The Northern District Of Illinois
Eastern Division

Donald M. Umphrey and
Douglas J. Marsden,
Plaintiffs,
v.
McGraw-Edison Company,
Defendant.
No. 68 C 1148

MEMORANDUM OPINION AND ORDER

This case arises out of the allegation of plaintiff Umphrey that he is the inventor of and holds the patent rights in a high tension oil switch, design patent number 2,909,633. He recites further that he licensed defendant McGraw-Edison to make and sell equipment embodying the teachings of his patent, which license agreement required of McGraw-Edison bi-annual accounting and royalty payments at an agreed percentage of net sales.

Umphrey, while employed by McGraw-Edison, designed and built for his employer a 69KV circuit breaker embodying the teachings of his patent, which breaker was tested in 1959, but not put into production. Subsequently, McGraw-Edison did produce and sell two circuit breakers known as models AHJ and HF which Umphrey claims embody his invention. McGraw-Edison has refused his demand for royalty payments on the grounds that the AHJ and HF circuit breakers do not embody the invention disclosed by the Umphrey patent and, therefore, are not covered by the license agreement.

Defendant admits the building and unsuccessful testing of a circuit breaker embodying the teachings of this patent, but denies that its currently produced AHJ and HF models infringe.

Defendant McGraw-Edison has counterclaimed, alleging a bad faith claim of the application of the Umphrey patent

to the AHJ and HF type circuit breakers, and seeking a declaration that the Umphrey patent number 2,909,633 is not infringed by any structure manufactured by the plaintiff, and an award of attorneys fees and expenses they have incurred in the defense of this case.

The gist of the counterclaim is also the central contention of the McGraw-Edision defense. It is that the Umphrey patent in question was and is directed to and applicable only to a "minimum oil" type breaker, as distinguished from the tank type breakers claimed to be the infringing devices.

It is essential to an understanding of this case to comment briefly on the nature of the device involved. The circuit breakers involved (also referred to as high tension oil switches) are electrical switches designed to create a path for or interrupt the flow of electrical current. They are designed generally for use by public utilities in conjunction with the transmission of electrical current at extremely high voltages.

In the opening or breaking of a circuit at high voltages, an arc is produced between the separating contacts, which for a variety of reasons it is desirable to minimize and quench or extinguish as quickly and completely as possible. The initial step taken to achieve this goal is to submerge the separating metal contacts entirely in oil. This does not completely solve the problem, however, since the arc before being quenched by the oil vaporizes a portion of the oil, with the resulting gases creating problems of pressure and of reduction of the dielectric (or insulating) efficiency of the oil.

The use of oil as a medium within which to quench an arc is accomplished basically in two differing ways. The accused devices are both of a type of circuit breaker referred to as a tank type. In this type of switch, the entire device, the interrupter contacts, the chamber surrounding them, the parts through which gases and pressures created by the arc are vented and the baffles and other devices minimizing

the undesirable effects of the arc all totally contained in an outer shell or tank which is filled with a large quantity of oil.

Because in the event of a failure of a tank type circuit breaker, the large quantity of oil constitutes a potential safety hazard, considerable effort has been expended in the industry to improve and perfect another type of circuit breaker commonly referred to as the "minimum oil" or "oil poor" circuit breaker, a type also widely used. In simplest form, the difference between the oil poor breaker and the tank type breaker is that instead of submerging the entire apparatus in a large quantity of oil, the oil poor breaker introduces oil into the area of the interrupted contacts in a jet or stream under pressure generated by a pump.

An aspect of the developing technology of high voltage interruption has been the use of the energy generated by the arc to assist in its quenching. This has been accomplished by surrounding the oil immersed contacts with a chamber (the interrupter chamber) which partially contains the energy and gases created by the arc, and through various channels, baffles and ports, uses this energy to direct the flow of oil within the tank to enhance the cooling and quenching action of the oil, and to minimize and disperse the ionized gases created by the arc. Because of the use of the energy generated by the arc to quench the arc, this type of design is referred to as a "suicide interrupter," and the suicide features have been the subject of a variety of inventions and patents.

The desirable effects achieved in the interrupter chamber may be intensified by supplementing the pressures generated by the arc itself with an additional source of energy. Thus, a spring loaded or otherwise driven piston may create a gas or oil pressure impulse in the interrupter chamber to achieve cooling and quenching effects not possible from the suicide principle alone.

A final aspect of the problems created in connection with high voltage current interruptions arises out of the fact that circuit breakers must be designed to function within a wide range of voltage loads. This necessitates a design capable of containing and dissipating the large volume of gas generated by a high current interruption to avoid tank explosions and fires. But the ports and vents required to achieve this capability are excessive in the instance of low current interruptions where it is desirable to contain a certain degree of pressure and turbulence in the interrupter chamber, a condition thwarted by the larger venting areas necessary to high current switching.

Essential to the Umphrey patent is the use of a jet of oil under pump produced pressure directed against an interrupter chamber port or vent. In the case of low voltage interruptions, the lower pressures in the interrupter chamber are not sufficient to offset the external pressures against the port from the jet nozzle, and the porting or venting area is thus reduced as though by a closure of the port. In high voltage interruptions, the excessive pressures in the chamber are higher than the jet stream pressure and the port functions as a vent by virtue of the internal chamber pressures overcoming the external jet nozzle pressure directed at the outside of the port. The operation and effect of this jet principle is well described in those exhibits introduced by plaintiff which embody the sales and promotional claims of McGraw-Edison for the AHJ and HF circuit breakers. It is referred to therein as the jetstream system of arc interruption and is the principle and the invention embodied in Umphrey patent number 2,909,633.

This conclusion is not altered by defendant's argument that the application (No. 639,266) which resulted in the issuance of patent number 2,909,633 illustrated the use of the invention in conjunction with the "oil poor" or "minimum oil" type circuit breakers. There is nothing inherent in the concepts of this invention which limits its application to minimum oil type circuit breakers, nor

renders it unsuitable for use in tank type circuit breakers. The Umphrey concept is readily adaptable for use in both types of circuit breakers.

In accordance therewith, the following are the facts found and the conclusions reached by the court.

FINDINGS OF FACT

Plaintiff Donald M. Umphrey is an individual residing in California. He is a citizen of the United States. He is also the inventor of the subject matter of United States Letters Patent Number 2,909,633 (hereinafter called the '633 patent).

Plaintiff Douglas J. Marsden is also an individual and a citizen of the United States, residing in California.

McGraw-Edison Company, the defendant in this action, is a Delaware corporation. It has its principal place of business in Elgin, Illinois, within the jurisdiction of this court.

Plaintiffs brought this action to recover royalties under a contract entered into by and between the parties as of June 10, 1958.

The contract in suit incorporates by reference a patent application, Serial No. 639,266, which had been filed by plaintiff Umphrey on February 11, 1957. The Umphrey application issued as the '633 patent on October 20, 1959. The term of the contract is fixed "for the life of the patents eventuating from" the Umphrey application and will accordingly expire on October 20, 1976.

In paragraph four of the contract, defendant McGraw covenanted to pay plaintiffs royalties equal to specified percentages of defendant's ". . . net selling price of any equipment . . . embodying the teachings and claims of said application Serial No. 639,266 filed February 11, 1957 and/or any patents eventuating therefrom."

The written contract in suit makes no distinction between tank type and minimum oil type circuit breakers.

The teachings and claims of the Umphrey application and resulting '633 patent involve broadly the projection of a stream of oil through a relatively vented region into the exhaust port of an arc chamber in an oil circuit breaker. All of the claims of this patent are directed to combinations of elements which embody this concept. The Umphrey concept was adaptable from the very beginning for use in both tank and minimum oil types of circuit breakers.

Drawings submitted by Umphrey to the patent attorney for use in preparing the patent application showed the invention embodied in a minimum oil breaker, the type of structure which Umphrey and Marsden were building at that time. The patent application specifically describes a minimum oil type of breaker in the specification of the patent application, but the specification is not limited to that type. The claims in the patent application apply to tank type breakers as well as minimum oil type breakers.

Defendant McGraw has been selling its types HF and AHJ circuit breakers since prior to the commencement of this suit. They are particularly described and illustrated in technical bulletins issued by the defendant as well as in defendant's mechanical drawings, advertising and trade literature.

Each of the accused HF and AHJ circuit breakers, as illustrated and described in the said literature of the defendant, is a high tension electrical switch in which there are a fixed contact and a movable contact, an opening spring and linkage between these elements to open and close the contacts as the breakers are operated. The contacts are disposed in a tank substantially filled with oil at atmospheric pressure. Surrounding the contacts is a shell containing a stack of baffles which has a central cylindrical opening through which the movable contact travels. As the movable contact separates from the fixed contact, an arc is drawn down this central opening, which is accordingly commonly referred to as the "arc path." Exhaust ports are located in opposite sides of the shell to permit exhaust gases produced by the arc to exit into the main body of oil

within the tank, thereby relieving any excessive pressure created by the arc inside the shell. Facing one of these exhaust ports from a short distance outside the shell is a nozzle which directs a jet of oil into the port through the intervening, unconfined body of oil in the tank.

Under low current conditions, the oil jet in each of the accused breakers is designed to close off the port at which it is directed, while at high current values the exhaust pressure forces back the oil jet. The oil jet condenses the exhaust gases as they escape into the unconfined body of oil between the nozzle and the exhaust port. When arcing stops, the oil jet is forced through the shell and out the opposite exhaust port, flushing out arc products and assuring fast dielectric recovery strength of the arc path. This system of arc interruption is designed to provide fast, efficient interruption of both high and low current level faults and to make possible reliable high speed reclosing of the breakers.

The accused circuit breakers and the circuit breaker described and claimed in the '633 patent are organizationally and functionally identical in achieving interruption of both high and low current arcs. In the accused breakers, the high velocity jet is projected across an unconfined intervening space between the nozzle orifice and an exhaust port from the shell. At that port, the kinetic or velocity energy of the jet is converted back to that of pressure in order to maintain a pressure in the arc path responsive to all fault current levels. This is precisely the function and organization of structural elements taught by the '633 patent.

Each of the claims 1, 2, 6 and 7 of the '633 patent accurately describes the structure and operation of defendant's HF and AHJ circuit breakers.

None of the patents and publications asserted by defendant as prior art with respect to the '633 patent show any of the combinations set forth in claims 1, 2, 6 and 7 of that patent. The combinations claimed in claims 1, 2, 6 and 7 of the Umphrey '633 patent differ from the prior art.

There is no basis for regarding the subject matter of the Umphrey '633 patent as an improvement on the subject matter of Umphrey's earlier patent number 2,647,973. The organizations of parts and principles of operation of the two devices are antithetical.

CONCLUSIONS OF LAW

The court has jurisdiction of the parties and of the subject matter of this action.

The contract in suit became effective between the parties hereto as of June 10, 1958 and has remained in full force and effect at all times since that date.

Plaintiff Donald M. Umphrey is the owner of all right, title and interest in and to United States Letters Patent Number 2,909,633, subject only to the license rights held by the defendant under the contract in suit.

United States Letters Patent Number 2,909,633 and all of the claims thereof are good and valid in law.

There is nothing in the conduct of plaintiffs, or either of them, as revealed by the evidence in this case, constituting (a) any misuse of the patent in suit, (b) any violation of the antitrust laws, or (c) any basis for an estoppel against asserting the patent in suit as covering the defendant's accused devices.

Each of claims 1, 2, 6 and 7 of United States Letters Patent Number 2,909,633 covers each of the accused devices designated by defendant as its types HF and AHJ circuit breakers and would be infringed thereby in the absence of the license held by defendant under the contract in suit.

Defendant is obligated by the contract in suit to pay royalties to plaintiffs on its sales of types HF and AHJ circuit breakers.

Plaintiffs are entitled to judgment holding defendant liable under the contract in suit, dismissing defendant's

counterclaim and directing that an accounting be made to ascertain the amount of defendant's liability, including interest, cost, and attorney fees incurred by plaintiffs with respect to the matter of the counterclaim.

Wherefore, plaintiffs shall recover from the defendant the amount of royalties owing by the defendant to plaintiffs pursuant to the terms of the contract in suit, together with interest thereon. The defendant's counterclaim is hereby dismissed without costs. This action is hereby referred to a Special Master to take evidence upon and render an accounting as to the extent of the defendant's sales of its types HF and AHJ circuit breakers with direction to report to this court the amount of the royalties owing by the defendant to the plaintiffs under said contract. The Special Master will be Walter H. Moses, Sr., 33 North Dearborn, Room 1722, Chicago, Illinois.

Enter:

/s/ Frank J. McGarr
United States District Judge

Dated. Jul 29 1971

UNITED STATES DISTRICT COURT
Northern District Of Illinois
Eastern Division

Name of Presiding Judge, Honorable Frank J. McGarr

Cause No. 68 C 1148 Date July 29, 1971

Title of Cause

Umphrey and Marsden v. McGraw-Edison

Pursuant to memorandum opinion and order entered this day, plaintiffs shall recover from the defendant the amount of royalties owing by the defendant to plaintiffs pursuant to the terms of the contract in suit, together with interest thereon. The defendant's counterclaim is hereby dismissed without costs. This action is hereby referred to a Special Master to take evidence upon and render an accounting as to the extent of the defendant's sales of its types HF and AHJ circuit breakers with direction to report to this court the amount of the royalties owing by the defendant to plaintiffs under said contract. The Special Master will be Walter H. Moses, Sr., 33 N. Dearborn, Room 172, Chicago, Illinois.

1 UNITED STATES COURT OF APPEALS
For the Seventh Circuit
Chicago, Illinois 60604

(Argued September 14, 1972)
December 14, 1973

Before
Hon. Luther M. Swygert, Chief Judge
Hon. Roger J. Kiley, Circuit Judge
Hon. Thomas E. Fairchild, Circuit Judge

No. 71-1686

DONALD M. UMPHREY and
DOUGLAS J. MARSDEN,
Plaintiffs-Appellees,

vs.

McGRAW-EDISON COMPANY,
Defendant-Appellant.

Appeal from the United States District Court for the Northern District of Illinois, Eastern Division.
FRANK J. McGARR, Judge.
No. 68-C-1148

ORDER

This is an appeal from a judgment awarding plaintiffs royalties under a contract, and determining that a patent issued to one of plaintiffs is valid and has been infringed by defendant. Attorney's fees were awarded to plaintiffs. The judgment is final except for an accounting.

Plaintiffs Umphrey and Marsden brought an action, with jurisdiction based on diversity, seeking royalties under an agreement by which plaintiffs had granted defendant McGraw an exclusive license under a patent application filed February 11, 1957, and entitled "High Tension Oil Switch". On October 20, 1959 patent No. 2, 909,633 was issued thereon to Umphrey.

The complaint alleged that McGraw's AHJ and HF oil circuit breakers were subject to the royalty. Among other defenses, defendant McGraw denied infringement and claimed the patent invalid for obviousness. In 1969, the

district court held, in accordance with decisions then
2 accepted as the law, that defendant, as licensee, could not challenge the validity of the patent. *Umphrey* v. *McGraw-Edison Company*, 294 F. Supp. 75 (N.D. Ill., 1969). After the decision in *Lear, Inc.* v. *Adkins*, 395 U.S. 653 (1969), the district court permitted reinstatement of defendant's counterclaim, challenging validity, and reasoned that although the action was brought under a contract, "the substantive issue before this court is whether the defendant's accused products employ the teachings set forth in the plaintiffs' patent." For practical purposes, this appears to be an action for infringement, except that liability for royalties would be the applicable remedy.

On appeal the principal question as to infringement appears to be one of interpretation of the claims. McGraw also argues that if the claims be construed so that the accused breakers infringe, the claims as so construed are invalid for obviousness. McGraw asserts that the district court failed to make the *Graham* analysis required in considering whether the subject matter would have been obvious. In fact no such analysis appears in the opinion, findings, or conclusions filed by the district court. See *Graham* v. *John Deere Co.*, 383 U.S. 1, 17; *Gass* v. *Montgomery Ward & Co.*, 387 F.2d 129 (7th Cir., 1967); *Rockwell* v. *Midland-Ross Corporation*, 438 F.2d 645 (7th Cir., 1971).

Claims 1, 2, 6, and 7 were found to be infringed.

Claim 1 follows:

"1. A high tension electrical switch comprising the combination of elements designated as elements (*a*) to (*d*) and defined as follows: element (*a*), a pair of relatively movable contact members adapted to be closed to complete a circuit and separated to form an arc-path there-between; element (*b*), means for moving at least one of said contacts to bring the pair thereof alternatively into their closed and separated positions; element (*c*), an interrupter structure closely surrounding said arc-path and having formed therein an exhaust passage, at least one port connecting from

said arc-path into said exhaust passage and a nozzle adapted to direct a jet of fluid into said port in a direction counter to flow of fluid from said arc-path into said exhaust passage; and element (*d*), pumping means connected to operate concurrently with element (*b*) to force a jet of fluid through the nozzle of element (*c*) as the contacts of element (*a*) are separating."

3 A number of elements in the combination described in each claim are old. The element which is critical in this action is element (*c*) in Claim 1, an identical element in Claim 2, and corresponding, but differing, portions of Claims 6 and 7. The corresponding portion of Claim 6 reads:

"an interrupter structure substantially surrounding the space between said contacts as they move apart, said structure being provided with an exhaust port having an inner end and an outer end, said inner end opening directly into said space, a nozzle facing said outer end . . ." The corresponding portion of Claim 7 reads:

"an interrupter structure defining an arc chamber between said contacts as they separate, an exhaust passage, and an exhaust port connecting said chamber to said passage, a nozzle opening into said exhaust passage opposite and facing said exhaust port . . ."

Each of the claims includes a portion corresponding to element (*d*) in Claim 1, means to force fluid through the nozzle, with the addition in Claim 7 of whereby the pressure in said chamber is maintained substantially at the impact pressure of said stream of oil."

Defendant's name for the feature of the accused circuit breakers which is claimed to infringe is "Jetstream interruption". Defendant's literature describes its functioning as follows:

"The stored-energy system used in the Type AHJ [or HF] breaker to accomplish these objectives consists of a high-strength glass epoxy interrupter with balanced exhaust ports.

"Mounted on the opening spring barrel housing, which is located in the tank, are two glass epoxy nozzles, aimed at one of the exhaust ports in each of the two interrupters in the tank. The opening spring is attached to a piston which starts to move as soon as the breaker contacts start opening. This piston forces a high energy oil jet out the nozzles and directly at the exhaust port in the interrupter.

"The pump with its associated nozzles is not directly coupled to the interrupter ports, but is separated by a considerable distance through the oil in the main breaker tank . . .

"At the higher current values, the oil jets are forced back from the interrupter ports by the high velocity exhausts from the chambers, but the intermixing of the
4 cool oil from the jets with the hot, vaporized exhaust, creates a highly beneficial condensing action. By this condensing action, the effective volume of gas released into the main tank is greatly reduced, and mechanical demonstration is minimized. . . .

"As the current value decreases on approaching current zero, the gas pressure drops and the oil jet penetrates again into the interrupter, cooling and deionizing the gas closer to the arc-path. As soon as the arcing stops, the jet of oil is forced through the interrupter, flushing the arc products from the arc path. . . ."

Defendant points out that the accused devices are tank type breakers, in which only a small fraction of the oil is involved in quenching an arc and the presence of the bulk of the oil is desirable for other reasons. The circuit breaker pictured in the patent drawings, on the other hand, and described in the specifications is of a so-called minimum oil type. The specifications state that the invention relates "particularly to switches of the 'minimum oil' type", and that its "primary object . . . is to provide a 'minimum oil' type of high-tension switch or circuit-breaker . . ." The claims, however, are not expressly limited to the minimum oil type, and we do not view the emphasis on that type in

the specifications as excluding the possibility that the claimed invention could be incorporated in a tank type breaker.

Mr. Harrington, plaintiffs' expert, stated:

"The Umphrey application . . . disclosed novel means of supplying oil to an interrupting chamber. In my opinion, these means made possible:

(a) maintenance of a certain minimum pressure within the interrupting chamber during current interruption;

(b) automatic control of the emission of oil and gas through the exhaust ports of the interrupting chamber;

(c) provision of an oil supply instantly available to the interrupting chamber (since the column of oil does not have to be placed in motion after interrupting chamber pressure drops); and

(d) prevention of the forcing of gases or oil back into the pump cylinder, thus making the use of check valves unnecessary.

"The Umphrey application teaches that these results may be accomplished through use of a high-velocity oil jet issuing from a nozzle. The jet is projected across a space between the nozzle orifice and an interrupting chamber exhaust port. . . .

". . . [It is] . . . projected across an intervening space which is essentially unconfined.

"This oil jet is directed across the space toward an exhaust port in the interrupting chamber so that the jet blocks the opening and no gas or oil may be expelled counter to flow of the jet unless the pressure within the interrupting chamber becomes greater than the impact pressure of the oil jet. The jet therefore serves as a biased shutter in the port.

"The Umphrey patent application further teaches that during conditions of high pressure within the interrupting chamber the jet is merely deflected within the unconfined

space. Here its energy is dissipated or it may be broken up by the gases and oil emerging from the interrupting chamber exhaust port, creating turbulence and cooling and condensing of the emerging gases and oil vapors.

"If pressure within the interrupting chamber is less than the jet impact pressure, the jet will enter the chamber and the pressure within the chamber will be maintained as some fraction of the jet impact pressure. The jet will also cool and flush the chamber."

Mr. Linde, defendant's expert, described the prior art and pointed out: "It has also been old to provide for forcing the fluid to move across or in line with the arc path so that the arc and its products are interposed between the incoming fluid and its exhaust. Umphrey is novel in positioning a nozzle for each port at right angles to the exhaust passage but directing its jet of fluid into the exhaust port that opens into the arc chamber, thus hydraulically blocking the only exit from the arc control chamber. There is no cross-venting of the arc path. The new and useful result which Umphrey claims from such combination of elements old in and of themselves is to control the pressure in the arc path as a function of the dynamic impact pressure of the oil jets."

The prior art does not appear to have included the Umphrey concept of projecting a stream of oil across an essentially unconfined space, aimed at an exhaust port, in an interrupter structure, the port leading from the arc chamber, so that the jet impelled oil will enter the port only when the jet applies more pressure than exists in the arc chamber. This concept is present in the accused devices, although it is clear that in them there are ports, leading from the arc chamber into unconfined space, into which no jet of oil is projected.

6 The district court deemed the presence of the concept, just mentioned, controlling.

He said:

> "The teachings and claims of the Umphrey application and resulting '633 patent involve broadly the projection of a stream of oil through a relatively vented region into the exhaust port of an arc chamber in an oil circuit breaker. . . .
>
> • • •
>
> "The accused circuit breakers and the circuit breaker described and claimed in the '633 patent are organizationally and functionally identical in achieving interruption of both high and low current arcs. In the accused breakers, the high velocity jet is projected across an unconfined intervening space between the nozzle orifice and an exhaust port from the shell. At that port, the kinetic or velocity energy of the jet is converted back to that of pressure in order to maintain a pressure in the arc path responsive to all fault current levels. This is precisely the function and organization of structural elements taught by the '633 patent."

The Court made a finding that the combinations claimed in the '633 patent were not anticipated, and a conclusion that the claims are valid. The court did not expressly address the question of obviousness.

Differences between the accused devices and the claims, arguably existing and significant, are: (1) The nozzle in the accused device, and the area through which it impels the stream of oil, even if the latter be deemed an exhaust passage, are not formed within the interrupter structure; (2) there are ports in the interrupter structure in the accused device into which no stream of oil is impelled from outside the arc chamber; (3) when a stream of oil enters the port in the accused device, it impels oil transversely through the arc chamber and out of the interrupter through the port on the opposite side.

Difference (1). In the accused breaker, the nozzle is in the portion of the breaker which is filled with oil, and
7 the stream of oil is impelled through the oil toward the

port of the interrupter. Neither the nozzle nor the oil-filled space through which the stream is impelled is part of, or formed within, the interrupter structure. The nozzle must correspond to the nozzle referred to in the claims, and the oil-filled space through which the stream of oil is impelled must, if attention is being given to Claims 1, 2, or 7, correspond to the exhaust passage referred to in those claims.

In Claims 1 and 2, the language "an interrupter structure . . . having formed therein an exhaust passage . . . and a nozzle" clearly requires an exhaust passage and nozzle which are parts of the interrupter structure. In Claim 6, the corresponding language is "an interrupter structure . . . being provided with . . . a nozzle" and in Claim 7, "an interrupter structure defining . . . an exhaust passage, . . . a nozzle opening into said exhaust passage." Although the language of Claim 6 does not so clearly require the nozzle to be a part of the interrupter structure, and Claim 7 does not so clearly require both nozzle and exhaust passage to be parts thereof, such construction is at least reasonable.

A portion of the specifications clearly so requires, and reads: "The interrupter also has formed within it an exhaust passage for the escape of gases generated in the [arc], connected to the arc chamber by at least one and preferably several exhaust ports. Also formed in the interrupter is a nozzle terminating in an orifice adapted to direct a jet of oil directly into each exhaust port."

Difference (2). In the accused breaker, there are exhaust ports at which no nozzles are aimed. It is at least a reasonable construction of the claims that there is to be an opposing nozzle for each port. Claims 1 and 2 say: "at least one port . . . and a nozzle adapted to direct a jet of fluid into said port . . ." Claim 6 says: "an exhaust port having an inner end and an outer end . . . , a nozzle facing said outer end, and means forcing a continuous stream of fluid through said nozzle toward said exhaust port . . ."; Claim 7 says: "an exhaust port . . . , a nozzle . . . facing said exhaust port, and means forcing a stream of oil through

said nozzle toward said port . . .". Claim 7 adds, moreover, that a result of the stream from the nozzle toward the port is to be that "the pressure in said chamber is maintained substantially at the impact pressure of said stream of oil."

8 Although the claim language does not compel the construction that every port must be the target of a stream from a nozzle, that construction is spelled out in the portion of the specifications quoted under Difference 1, above, and also in the following portion: "Opposite the exhaust port a tapered channel 51 comprises a jet-forming nozzle which directs a stream or jet of oil directly into each exhaust port 49 . . ."

Difference (3). In the accused breakers when conditions of pressure inside the interrupter permit the jet of oil to penetrate the exhaust port at which it is aimed, the stream is forced through the interrupter, flushing the arc path, and a port on the opposite side, in register with the first, permits the cross flow to exit the interrupter. Assuming the construction of the claims above indicated, i.e., that there is no port which is not the target of a stream of oil, the claims exclude cross venting as found in the accused breakers.

On November 20, 1958, after original rejection, the Patent Office suggested that a claim be made for the purpose of creating and resolving an interference with the application of Gantenbein. (Patent No. 2,919,330, "Low-Oil Content High-Tension Oil Circuit Breaker", was issued December 29, 1959 to Gantenbein's assignee.) The suggested claim (in very substantial part Claim 2 or Gantenbein) included: "an arc control chamber enclosing the space in which arcing occurs and including a gas venting channel alongside said space, . . . a wall of said arc control chamber having slots leading to said gas venting channel and so located that an arc-quenching stream of oil moving transversely across an arc will pass through said slots into said venting channel, said chamber being also provided with an

oil inlet in a wall thereof, . . . a pump . . . adapted to push oil through said inlet into said chamber, and a non-return valve adapted to open to admit oil only when the pressure within said chamber is below a predetermined magnitude."

It is evident that the suggested claim embraced the concept of impelling a stream of oil transversely through the arc space and out of a port in the interrupter, but did not include the Umphrey concept of projecting a stream of oil across an essentially unconfined space, aimed at an exhaust port in an interrupter structure, the port leading from the arc chamber, so that the jet impelled oil will enter the port only when the jet applies more pressure than exists in the arc chamber.

9 Rule 203(b) of the Patent Office provides that when a claim is so suggested for interference purposes, the applicant's failure to make the claim is a disclaimer of the invention covered by that claim.

Umphrey did not make the suggested claim, but in his response asserted, among other things, that he "does not employ an arc-quenching stream of oil moving *transversely* across the arc . . .". He pointed out, further, that his apparatus does not have a non-return valve, and that the fact that one is unnecessary is one of the great advantages of his apparatus, thus emphasizing the concept of projecting a stream of oil across an essentially unconfined space, referred to above. Whether or not the absence of the latter concept from the suggested claim makes the doctrine of file wrapper estoppel less than conclusive on the issue of infringment in the present case, his disclaimer at least tends strongly to support the construction that the impelling of oil transversely across the arc was excluded from any combination he claimed.

It is clear that the invention protected by the patent is the use, in combination with several recognized and individually unpatentable elements of arc interrupters, of the concept of projecting a stream of oil across an essentially unconfined space and against an exhaust port. The ultimate

question is whether the other elements of the claimed combination include an arrangement of ports so that one or more do not have a stream of oil aimed at them and so that when the stream of oil enters a port it can be impelled transversely across the arc and out of another port. If such an arrangement fall within the elements of the claimed combination, the accused breakers infringe. Otherwise not. Putting the question another way, is the presence of one or more ports which are not the target of a stream of oil an immaterial addition to the combination claimed, or does the presence of such ports produce a combination different from the combination claimed?

Our best construction of the claims is that they did not contemplate ports other than those at each of which a stream of oil was aimed. The presence of ports not the target of a stream of oil is a material and not immaterial difference in the combination.

We have already indicated several respects in which the interpretation of claim language leads to this conclusion. We also note that Claim 7 expressly calls for the maintenance of pressure within the interrupter "substantially at the impact pressure of said stream of oil." Although the other claims lack that expression, several portions of the specifications indicate that the maintenance of such pressure, presumably by having a stream under such pressure directed at every port, is significant. These follow:

"Except as they are retarded by impact of the gas molecules emerging from the exhaust ports the particles of oil emerging from the jets retain their momentum and as a result they establish a dynamic pressure at the outlet of the exhaust port that approaches the pressure delivered by the pump. Accordingly, the pressure within the arc chamber is maintained at something approaching this value, but cannot materially exceed it."

• • •

"As soon as the current in the arc starts to fall, with smaller release of energy, the oil from the jet enters deeper and deeper into the exhaust ports, maintaining the pressure within the arc chamber and preventing it from dropping below atmospheric, immediately following the break, because of the momentum of escaping gas, as can happen in conventional types of interrupter."

• • •

"As soon as this occurs, however, the jets can enter first the exhaust ports, and, as energy released in the arc decreases they enter the arc chamber itself first as high velocity droplets and later as a solid stream of oil. The time required for the jets to cross the exhaust passage 47 is only approximately two milliseconds. The turbulence within the arc chamber is intense. Both the turbulence and the cooling effect of the entering oil tend to deionize the arc path with extreme rapidity. . . . The momentum of the jets not only conquers the momentum of the escaping gas to prevent the formation of a region of lower-than-atmospheric pressure but establishes a dynamic pressure which may be as high as several atmospheres."

We think the emphasis on turbulence and maintenance of pressure within the arc chamber indicates that the provision of additional ports at which no streams of oil are
11 aimed was not contemplated and is a material departure from the combination claimed.

If the resolution of the ultimate issue rested upon critical findings of fact made by the district court, the not-clearly-erroneous standard of Rule 52(a), F.R.Civ.P. would apply. The question here, however, essentially one of construction of the patent claims, is a question of law rather than fact, and it is our best judgment that a proper construction requires a decision that the accused devices do not infringe. We express no opinion on the validity of the patent claims.

The clerk of this court is directed to enter judgment reversing the judgment appealed from, remanding the cause, and directing judgment dismissing the complaint.

UNITED STATES COURT OF APPEALS

For the Seventh Circuit

Chicago, Illinois 60604

January 14, 1974.

Before

Hon. LUTHER M. SWYGERT, Chief Judge

Hon. ROGER J. KILEY, SR., Circuit Judge

Hon. THOMAS E. FAIRCHILD, Circuit Judge

No. 71-1686

DONALD M. UMPHREY and
DOUGLAS J. MARSDEN,
Plaintiffs-Appellees,

vs.

McGRAW-EDISON COMPANY,
Defendant-Appellant.

Appeal from the United States District Court for the Northern District of Illinois, Eastern Division.

FRANK J. McGARR, Judge.

No. 68-C-1148

On consideration of the petition for rehearing filed in the above-entitled cause,

It Is Hereby Ordered that the petition for rehearing in the above-entitled appeal be and the same hereby denied.

Excerpts from Deposition of Donald M. Umphrey, taken by Defendant on September 24, 1968—Pages 32-38, 74-76, 116-117.

32 By Mr. Meroni:

Q. In all of those illustrations that you have made on this sketch, Exhibit No. 13, do you have a cross

33 vent?

A. Yes, to the same extent that any of these might be.

The invention, in general terms, pertains to apparatus by means of which a high-velocity stream of oil is directed into an exhaust port of the circuit breaker interrupter from a point external to the interrupter, or the arc chamber.

Q. Yes, but it is not transversely across in your patent. It runs into a blank wall, doesn't it?

A. No, no. The patent does not run into a blank wall, in any sense.

Q. I mean, referring to Figure 3, for example, you take the nozzle 51. When that jet of oil passes through the port 49 into the chamber, arc chamber 41, it then hits a blank wall, doesn't it? It doesn't go transversely out.

A. May I give my impression of the passage—I am sorry. You are correct. I was looking at the wrong figure.

Figure 49 is an exhaust port, and you will notice in

34 figure 4, which is a section elevation, and Figure 3, that the nozzle 51 is much smaller in cross-section area than the exhaust port 49.

Q. Now, do you agree that your patent does not employ an arc-quenching stream of oil moving transversely across the arc?

A. That it does not employ?

Q. Yes.

A. The patent does not—

Q. I call your attention to your own file history, Exhibit 5, on page 41. You said:

"Applicant does not employ an arc-quenching stream of oil moving transversely across the arc as specified in the suggested claim . . ."

A. Not necessarily, because the patent doesn't relate to that.

Mr. Smith, Sr.; Mr. Meroni, I would like to make a statement on the record about that claim.

That claim is not included in the patent, it was never included in the patent at any time.

Mr. Meroni: I so understand, but it is an admission
35 against interest.

By the witness:

A. It is not an admission, as I understand it, simply because the patent does not relate to whether the oil passes across the arc chamber or not.

By Mr. Meroni:

Q. I am talking about your patent now.

A. Yes. This patent relates only to apparatus employing a high-velocity stream of oil directed toward an exhaust port of an arc chamber of the circuit breaker.

Q. Now, on page 42, you say:

"Thus, in applicant's apparatus the stream of oil does not move transversely across the arc . . ."

I don't see how that could be any clearer than that.

A. It doesn't necessarily move transversely across the arc, that is true. That statement was made to point out that moving the oil transversely across the arc was not patentable and does not relate to this invention.

36 Q. Well, what you are trying to do now, in this drawing, Exhibit 13, the very thing you say wasn't patentable you are trying to embody in every illustration as being part of your patent, a transverse cross vent.

A. I have not said that that embodied necessarily a transverse cross vent.

Q. Well, I asked you the question before. We can have it read back, if you wish.

A. They could involve it, and they may not.

Q. Well, your answer was that they did. Now, either you say put, or you don't. We can go back in the record and find that.

A. They can, either way. For example, here in Figure 7, is there anything to prevent the oil from the high-velocity

stream from the right-hand nozzles from being deflected by arc turbulence and going out into the left-hand exhaust passages.

Q. Which figure are you talking about?

A. Figure 7 in the patent.

In fact, I am almost positive that under normal operation—

37 Q. That is something that you never built, as I understand, or took to the defendant.

A. Yes, we did build this.

Q. Well, Mr. Marsden had no recollection of it as being in the components that you built.

A. We mean we didn't build Figure 7?

Q. That is what I understand. That is a modification. I understood the one that you built was like the one shown in Figures 3 and 4.

A. I am sorry. I believe, as I recall what Mr. Marsden said, that various configurations were built. As a matter of fact, both of these were built in the same circuit breaker, the initial one, both Figure 3 and Figure 4.

Q. Well do you have any drawings showing them both built in the same circuit breaker originally? Do you have any showing of that at all?

A. I don't have any drawings of the circuit breakers, but I do recall that they were in there.

We had three poles in the circuit breaker, and we had at least these two in those three poles with perhaps another variation in another pole.

Q. Well, we are trying to give you every benefit of the doubt here, no matter how far you stretch this, but—

38 A. I am not trying to stretch anything.

Q. —but I fail to see where, in your description of Figures 6 and 7, you describe anything at all about there being any cross vent, or about the oil going clear through. I can't see that any place.

It would seem to me that if you would have explained that to your lawyer, he would have described it. There isn't any description any place about a cross vent.

A. In Figure 7 is it conceivable that under agitation in the arc column 41 that a considerable portion of the oil

from the vents on the right-hand nozzles, or from the nozzles on the right-hand side, could go into the arc chamber, and if there was not an arc there, it could cross and a great deal of it could go out of the left-hand vent.

• • •

74 Q. And you are contending that because they used a nozzle to shoot a cross jet of fluid through an arc that that is what you invented? Is that what you are contending?

A. I didn't say that.

Q. Well, what more is there to it than that? And I am referring to these illustrations in these two booklets, Exhibits 7 and 9.

A. This apparatus here involves—

Mr. Smith, Sr.: You are pointing to the right-hand figure—

75 (There was a short interruption, after which the taking of the deposition was resumed as folows:)

Mr. Meroni: Proceed, Mr. Umphrey.

By The Witness:

A. This nozzle—

By Mr. Meroni:

Q. Referring to page 2, to the nozzle in the right-hand illustration, directly under "HF-36"?

A. The apparatus involves a high-velocity stream of oil directed into an exhaust port of a circuit breaker arc chamber.

Q. What is a high-velocity jet?

A. A jet of oil is commonly understood, I believe, as a flow of oil in which the energy is in velocity energy; that is, the pressure may be zero or ambient pressure.

Q. What is the specific calibration of a high-velocity jet, such as you were referring to in connection with this testimony?

A. Well, this particular jet here I believe runs about 100 feet per second spouting velocity from the nozzle.

76 Q. Well, is it your position that because anyone uses 100 feet-per-second velocity jet, in extinguishing an arc in a breaker, that that is a part of your idea, that is your idea?

A. If the stream—assume that the stream is mostly velocity energy—is pointed toward the exhaust port of an arc chamber, it does come under this patent. That is my belief.

Q. Well, in any cross jet isn't it pointed toward some sort of a gas exhaust port?

A. No.

Q. It is not?

A. I don't know of any other circuit breaker that functions in that manner.

• • •

116 Q. I refer you to Column 3 of your patent, Exhibit 1, that you have before you, and I call your attention to Lines 63 to 65.

Now, this is part of the specification; it is a description, and it has nothing to do with claims. You so understand, don't you, that this is a specification?

A. Yes.

Q. Now, it says:

"Also formed in the interrupter is a nozzle terminating in an orifice adapted to direct a jet of oil directly 117 into each exhaust port."

Now, will you point out, in the drawings, what interrupter you are talking about there.

A. In this particular instance the nozzle, which is a necessary part of the interrupter, is 51, Figure 3.

Q. And what is the interrupter? Is that what is shown in Figure 3?

A. The interrupter consists of the relatively movable contacts, the arc chamber, and the nozzle.

Q. Well, as an engineer is it your understanding that an interrupter structure as such has to have, as a part of it, the contacts?

A. The complete interrupter structure must involve relatively movable contacts in order to have drawn within it an arc.

• • •

Excerpt from Deposition of Everett J. Harrington, Taken By Defendant April 20, 1970—Pages 134-143.

134 Q. Now, moving on to point (4) on page 18 of your statement, it says:

"This oil jet is directed across the space toward an exhaust port in the interrupting chamber . . ."

Can we understand that that exhaust port is the element 49?

A. That is correct.

Q. Is there any other exhaust port from the interrupting chamber 41, other than the exhaust port 49?

135 A. In this patent drawing?

Q. Yes.

A. No.

Q. Well, then, wouldn't your statement there be more clearly expressed, instead of saying "an exhaust port", if you said "the exhaust port"?

A. That is probably correct if my statement were confined only to the specific drawings shown in this patent.

My statements reference the teachings of the patent and I find nothing in the teachings of the patent that says there cannot be other exhaust ports.

Q. That is expressed negatively. Do you find anything in the patent that expresses affirmatively that there could be other exhaust ports?

A. I believe it says that there will be a plurality of exhaust ports.

Q. Could there be any exhaust port without a nozzle opposite it?

A. I do not, again, find anything in the teachings that says that it must not have them.

Q. Right in the next part of your item (4) here, you mention that the jet blocks the opening. Is there some

136 relationship there between the exhaust port and the jet?

A. Yes, there is, between the one toward which the jet is directed and the jet.

Q. If you have any information with respect to any teaching in the Umphrey patent where an exhaust port does

not have a nozzle located opposite it, I call upon you to point it out at this time.

A. May I ask you this question as a matter of trying to clear up in my mind what you are asking: Are you asking me if the teachings specifically say that there can be or should be incorporated in this device exhaust ports without nozzles pointing toward them?

Mr. Van Santen: Yes.

137 By The Witness:

A. Is this what you are asking me?

Mr. Van Santen: That is one way of expressing it, I think.

By The Witness:

A. I think I will have to answer that by saying no, I cannot point to a specific part of the teaching that says specifically there must be other exhaust ports.

By Mr. Van Santen.

Q. Or how about that there can be other exhaust ports?

A. I interpret the teachings that there can be, but not that it says that there must be.

Q. With reference to this interpretation, is it based on any part of the disclosure where the suggestion is made that there could be a port other than a port 49 located opposite a nozzle 51? There is another species here, a port—well, it does not have a number, but opposite the nozzle 51', which is the species of Figure 6.

A. I am perhaps basing my interpretation of the teachings on column 12, beginning on line 7, where it says:

138 "The interrupter structure can be modified as to the shape and direction of the various passages within it. The foregoing description and drawings are therefore intended to be merely illustrative, and the scope of the invention defined by the following claims. . ."

Q. Yes.

A. I take it from that that any designer who was following this would have free license, as he saw fit, if he considered it apropos, to add more passages and change the shape and direction.

Q. I see. So then the conclusions which you have expressed in your statement are based upon that assumption?

A. That is correct.

Q Referring further to point (4) on page 18 of your statement, we had stopped at the point where we were talking about the exhaust port in the interrupting chamber. The reference is:

"This oil jet is directed . . . so that the jet blocks the opening and no gas or oil may be expelled counter to
139 flow of the jet unless the pressure within the interrupting chamber becomes greater than the impact pressure of the oil jet."

Is that your understanding of one of the points of the essence of the Umphrey application?

A. Yes.

Q. Now, supposing we operated on the assumption that you suggested before and that we put openings in the interrupting chamber that were not associated with a jet.

Would gas and oil then be expelled without reference to the jet if the pressure in the interrupting chamber became greater than the impact pressure of the oil jet?

A. Are you saying, would the gas and oil be expelled from these other ports also?

Q. Yes.

A. Yes. I assume they would if the pressure on those ports were greater than the external pressure at the port opening.

Q. Then if the interrupting chamber were so vented, how could the jet maintain the pressure in the interrupting chamber?

A. You will have to give me a condition or a point
140 in time. What is the pressure within the interrupting chamber at this time? Is it greater than the impact pressure of the jet to which you have reference, or less?

Q. Let's take it both ways First, greater.

A. If greater, of course, this pressure would exist within all parts of the interrupting chamber, presumably, if they were all connected, even though there were other ports.

Q. Then gas or oil would be expelled, would it not, from the interrupting chamber?

A. Yes. We just covered that. That is right; it would be expelled.

Q. And it would be freely expelled through the unopposed opening? By "unopposed opening," I am assuming that we have added an opening without a corresponding jet, right?

A. Yes. Correct. Now, the other condition—

Q. In that condition, if the interrupting chamber is freely vented, do you maintain any pressure in there?

A. This is the condition in which we said that there is enough pressure that it is expelling gas from both the
141 other port and the port toward which the jet is directed, correct? This was the first condition.

A. You mean the pressure is so great that it is overcoming—

A. The jet.

Q. —the jet as well as going out the freely vented part?

A. Under this condition there must be pressure within the interrupting chamber greater than the jet impact pressure. It could not overcome it, regardless of the fact whether you had any other ports.

Q. Under that operating condition, then, would the jet have any effect on the pressure within the interrupting chamber?

A. It would have some effect because the pressure within this interrupting chamber will depend on how freely it is vented, and the fact that there is pressure within the interrupting chamber greater than the oil surrounding it, because of the exhaust gases coming out, means that the pressure within that chamber will be determined by the rate of evolution of gas and the resistance to the flow of those
142 gases out of the interrupting chamber through the exhaust ports, and if the jet impact pressure produces a bias on one of those ports, the gas cannot flow from that port as readily as if there were no jet there, so we have increased the resistance by that bias pressure at that particular port.

Q. Why doesn't the bias pressure just go out the freely vented ports, then?

A. The freely vented port combined with the port that has the bias due to the jet, the combination of those two areas and the resistance to flow is what is determining the pressure within the chamber, plus the evolution of gas within the chamber.

Q. But I thought your statement was predicated on the interrupting chamber being freely vented.

A. No. I never said the interrupting chamber was freely vented.

I said that the passage through which, or the space across which this jet projects or flows is freely vented. I did not say the interrupting chamber was freely vented.

Q. If the interrupting chamber is vented with unop-
143 posed openings and also vented with jet opposed openings, why will not the jet bias, if you will, just go out the other vents?

A. It can't because you are creating gas inside at a rate such that it must flow out of the exhaust ports, and if the pressure is high enough, it stops the flow of the jet into the interrupting chamber.

Q. In other words, you are saying that pressure is a function of both the cross sectional area and the flow of fluid, is that right, the volumetric flow of fluid?

A. And the resistance to flow.

Q. The resistance to flow, which would be the resistance—

A. The jet, the bias produced by this jet, is a form of resistance to the flow out of that particular exhaust port.

Excerpt from Deposition of Leonard J. Linde, Taken by Plaintiffs April 23, 1970—Pages 185-188.

185 By Mr. Pendleton:

Q. Is it also fair to say that Defendant's brochures, Defendant's Exhibits 7 and 9, represent that the jets are advantageous in the operation of the circuit breakers to which these brochures relate?

Mr. Van Santen: Technically, I object to the question because the documents, of course, are the best evidence. I do

not think your question was phrased as to whether this witness has an independent conclusion.

Mr. Pendleton: I will amend the question to ask the witness if that is the understanding that he derives from these brochures, namely, that the use of the nozzles and jets is advantageous.

By The Witness:

A. So the brochure says.

By Mr. Pendleton:

Q. Both of these brochures, according to your understanding of them, represent the use of the nozzles and jets to be advantageous, is that right?

186 A. Yes, as expressed in their literature here.

Q. Now, Mr. Linde, the brochure relative to the AHJ-54 circuit breaker is Defendant's Exhibit 7.

A. Yes.

Q. I would ask you to turn to page 2 of that publication, and ask you to read into the record, for further reference, the second paragraph under the heading, "high-current interruption."

Do you find the passage I have reference to, Mr. Linde?

A. Yes. I have it.

Q. Would you read it into the record, please.

187 A. All right.

"As the current value decreases on approaching current zero, the gas pressure drops and the oil jet penetrates again into the interrupter, cooling and de-ionizing the gas closer to the arc path. As soon as the arcing stops, the jet of oil is forced through the interrupter, flushing the arc products from the arc path. This flushing action insures that the dielectric strength of the interrupter will be maintained."

Q. Thank you. Now, will you find the paragraph of similar import in Defendant's Exhibit 9.

By The Witness:

A. Do you want me to read that?

Mr. Pendleton: No. You do not need to read it if you can say that it is of the same substance.

188 By The Witness:

A. It is of the same substance, but not quite the same wording.

Mr. Pendleton: Yes.

By Mr. Pendleton:

Q. Now, those indicated paragraphs of both Defendant's Exhibit 7 and Defendant's Exhibit 9 have to do with the effect of the jets at high-current values, do they not, or for high-current interruption, particularly? I call your attention to the heading of the section.

A. Yes.

Q. From the paragraph that you read into the record and the corresponding paragraph in Defendant's Exhibit 9, do you understand that the nozzles and jets are being represented as advantageous at the high-current part of the range of operation of both of these types of circuit breakers?

A. That is apparently the intent of these publications.

Excerpts from Trial Transcript of Defendant's Counsel's Opening Statement—Pages 21-23.

21 When the breaker has to be opened, a linkage mechanism that interconnects this actuator and a pump which sits over here and is also submerged in the oil (indicating) is operated and the entire crosshead comes down. This movable contact separates from the fingers up at the top and immediately an arc is drawn. The physical spacing dimension is such that the separation is in the expulsion tube on purpose, so that they will draw the arc in the expulsion tube and then deliberately destroy it so that the main contacts, the principal contacts, may open out in the tank of oil without burning themselves up.

22 So once the arc is drawn and this all has to happen within approximately 1/20 of a second.

The first thing that happens is that there is a deterioration of the metal forming the contacts. That is actually so hot and there is so much energy, it is actually like a stroke

of lightning and the metal itself starts decomposing. Then the oil within the expulsion spot starts to degenerate into gases, and forming quantities of hydrogen gas, and all the arc products, the gas and the oil, comes rushing down from the confined chamber up at the top surrounding the fired contacts, and goes down two passageways that are alongside a baffle stack on the inside of the expulsion tube. That baffle stack is made out of bone fiber, and it has a bunch of channels formed in it and passageways, so that the pressurized fluid and gases coming down those side channels are directed into the arc chamber. Then once they get into the arc chamber, if they are capable of getting in there because of the tremendous forces generated by the arc, they then start passing out, they have to go some place and they go out at right angles through a port on this side of the expulsion tube, and also another port on the other side of
23 the expulsion tube. That is what is very significant in this lawsuit, that we have ports on both sides of the expulsion tubes so that these large openings on both sides present what your Honor will hear referred to as a cross vented expulsion tube.

As the movable contact moves apart from the fixed contact, near the end of its stroke through the interrupter, it is wiped by a copper wire, and that in turn is electrically connected to a resistor, which further assists in the operation of the device. That briefly covers the operation of the accused device.

Excerpts from Trial Transcript of Donald M. Umphrey Testimony—Pages 135, 142-143, 146, 216, 220-222, 232-233.

135 Q. Why isn't it a fair statement?

A. The point at issue here is whether the device, whatever it may be, uses the concept taught by the original concepts.

Q. Well, what is your concept?

A. A stream of oil being projected through a relatively vented region into the exhaust port of an arc chamber.

• • •

142 By The Witness.

A. The interrupter forms the part of the circuit breaker operating on a new principle as set out by the patent description in its claims. As for instance, by patent Claim 1.

As I understand Claim 1, it pertains to a particular structure, but it does, I believe, apparently to me, contain an indication—may I read that?

By Mr. Meroni:

Q. Sure, sure, you may read it.

A. The part that pertains—

Q. We want you to read whatever you wish to in order to give an accurate answer.

143 Q. If it will help you, we have a production of it here that might make it a little easier. There it is.

A. Well, element (c) is the part that is the general teaching generic to the central, broad application.

(Reading:)

"An interrupter structure closely surrounding said arc-path and having formed therein an exhaust passage, at least one port connecting from said arc-path into said exhaust passage, and a nozzle adapted to direct a jet of fluid into said port in a direction counter to flow of fluid from said arc-path into said exhaust passage."

Q. Does that say that the interrupter structure has the nozzle?

A. Yes, as would be the case in any such application.

* * *

146 Q. Did you supply the defendant with a copy of the application at the time you signed the agreement?

A. Yes.

Q. What did that consist of?

A. It consisted of the application that was made, I believe, to the Patent Office by Mr. Lippincott.

Q. As filed?

A. As far as I recall, yes.

* * *

216 Q. As far as you knew, you did not submit a complete minimum oil breaker to Pennsylvania at that time, but you only submitted components in various stages of assembly?

A. It was nearly complete, yes.

Q. But, the actual prototype was not completed until after you entered the employment of the defendant?

A. That is true.

Q. So that the defendant was not able to actually see a completed minimum oil breaker like your patent until after you had assembled the first prototype at the plant, is that right?

A. Not entirely, because rather extensive drawings of the device, or sketches, had been given to Mr. Kerr and Swoish and they had observed them quite carefully.

• • •

220 The Court: Counsel, in the few moments before our noontime recess, before you get to another subject, which you are apparently about to do, may I ask the witness a question or two which will probably take us to noon, on topics you have already taken up, to clarify my own understanding?

Mr. Meroni: Sure, your Honor.

The Court: Mr. Umphrey, referring to the diagram on the screen, which is sheet 2 of your patent application '633, and with reference to the terms you have used in connection with this case and in connection with this patent application, indicating that a stream of oil is projected from nozzles through the exhaust ports and into and through the baffles or I am paraphrasing and my language may not be scientific—would you point out to me on there first where the nozzles are and secondly where the exhaust ports are, if that is the appropriate diagram for you to use. You may wish to use the one which is sheet 1 of that same patent application. You may refer to that, if you wish.

221 The Witness: I will refer to this one first, only to indicate that oil under pressure comes from below. The internal tube is used here, the column tube is used as a pressure duct inside, and oil is driven up through a short

duct 39'. That is the baffle there. It is driven up through this duct, which is also 43 in Figure 3, so that the oil then can go through nozzle 51, which is very short because of the limited space, the attempt being to keep the diameter down in order to keep the cost of the breaker low.

Then it goes across the freely vented space 47, which is vented into Section 45, which is actually part of the tank, and then can rise from there. It crosses, the jet of oil from the nozzle 51, crosses into exhaust port 49, into arc chamber 41.

The Court: How many exhaust ports are there opening out of the arc chamber?

The Witness: In this particular one here, there are—this is not exactly that, but it shows a section of it. There
222 are two on this side and two on this side (indicating).

The Court: I do not mean in that section of the drawing, but I mean in the entire arc chamber as you contemplated in this invention. How many exhaust ports did you use?

The Witness: There are three exhaust ports in this one, your Honor.

The Court: Where are the exhaust ports again with reference to any one of those drawings? In reference to arc chamber 41 on Figure 3, where again is the exhaust port?

The Witness: Your Honor, the arc chamber is here, 41, and then there is an exhaust port cut away here, through which gas can flow through to the atmosphere above. The exhaust port here is shown as being on the far side of the arc chamber, and then beyond that is shown the nozzle orifice pointing directly toward the viewer into the exhaust port.

The Court: Thank you. That helps me on that.

• • •

232 Q. As I recall, yesterday in your referring to defendant's tank type breakers here in suit, you treated the projection there of the oil jet through and across the arc chamber by a nozzle as involving your patented concept, is that right?

• • •

A. I believe so.

By Mr. Meroni:

Q. Now, in that respect, I would like to call your attention to your testimony at page 35, where you testified about you file history, which is Exhibit 5 here, and more particularly to page 42. The question was:

(Reading:) "Now, on page 42 you say: 'Thus in applicant's apparatus the stream of oil does not move transversely across the arc . . .'

I don't see how that could be any clearer than that."

233 Your answer was:

(Reading:) "It doesn't necessarily move transversely across the arc, that is true. That statement was made to point out that moving jet oil transversely across the arc was not patentable and does not relate to this invention."

A. Can I see that?

Q. Yes. Is that an accurate statement?

(There was a short interruption, after which the following further proceedings were had herein, to-wit.)

By The Witness:

A. Yes.

By Mr. Meroni:

Q. By "this invention", you mean your own invention that is here in suit?

A. Yes.

Excerpts from Trial Transcript of W. J. Smith Testimony—Pages 461-463- 473-490, 511-512, 523, 527-532, 539-541, 608-612

462 The arc is pulled in this interrupter chamber. This chamber is primarily a self-energizing type of chamber. The arc energy is needed to cause oil to flow to put out the arc on most interruptions.

In addition we have the ground potential pump, which is effectively a puffer to assist in low current operation and in purging the chamber.

You notice there is opposing vents in the chamber. A jet of oil comes out of the nozzle, goes through the chamber and purges the arc products.

463 Q. I hand you a contact cluster which has been identified as Defendant's Exhibit 9, and which is separate item—

A. This is the stationary contact structure within the interrupter.

Q. Does that correspond to the contact cluster in this model?

A. That is correct.

• • •

473 Q. How, could you, with the assistance of that broken-away model, which corresponds to 70-D, explain for the Court how this self-energizing interrupting principle is utilized.

A. I don't have a blade. I will have to simulate a blade.

The Court: I understand. Go ahead.

By The Witness:

A. (Continuing) Normally the breaker carrying current, the blade is engaged down in the tulip cluster. As the blade comes out to interrupt the circuit, it comes to a certain point where it parts contact with the stationary contacts and an arc is drawn.

Now, if this is a high fault current arc, or for that matter any arc, you are going to generate some gas at this point. You are going to vaporize some oil between the moving contact and the stationary contact. This generation of gas causes a pressure to be built up in the chamber sur-
474 rounding the stationary contact cluster.

Q. Is that a closed chamber?

A. Well, let me go on.

Q. All right.

A. (Continuing) Communicating with this chamber there is a passageway that goes up alongside the baffle stack on each side, and the cutaway as is shown on one side, and there is another similar passageway on the far side.

As this pressure builds up in this chamber, it applies a pressure to each of the individual vents in the baffle.

As the current approaches a current zero—this is an alternating current interrupting device—the oil in the vents or the passageways under pressure from the gas bubble at

the contacts moves into the space where the arc had been burning during its peak value. As it comes to current zero, this oil tends to move out and occupy the space where the arc had been burning.

The oil moving out does several things. First of all, it cools and deionizes the arc products, and finally it estab-
lishes the dielectric between the moving contact and the
475 stationary contact. Pretty obviously, the larger the val-
ue of current interrupted, the higher the pressure will go, and the more efficient this kind of interruption becomes
and the faster, also.

477 • • •

Q. Now, could you take 69-C, the physical exhibit, and explain for the benefit of the Court the same action and the flow of fluids in that baffle stack.

A. I am holding the baffle stack in the position it would be in the breaker, the black baffle being down. The stationary contact fingers would be above the baffle stack and the moving blade would be coming down through. The passageway communicating with the pressure generating volume is the flat side.

Q. When that is put in a cylinder, does it leave passages by the flat sides?

A. It leaves a passage, a crescent-shaped passage, down each side.

The rounded portion of the baffle stack fits quite closely
in the interrupter tube, and the vents out of the baffle
478 stack match the hole cut in the side of the interrupter
tube.

The Court: These have been referred to as ports throughout the trial.

Mr. Van Santen: Yes.

The Witness: Ports.

Mr. Van Santen: The witness has made references to Defendant's Exhibit 69-B.

By The Witness:

A. (Continuing) The oil then will flow—this is when the arc gets to a sufficiently low value of current that the oil can move—will flow from this volume adjacent to the flat

side of the baffle stack, into the arc chamber, and then make a 90-degree turn one way or the other and go out through the vents, taking with it the residual arc products.

• • •

480 Q. Roughly, in terms of energy, what sort of pressures are you dealing with when you draw an arc inside of an interrupter?

A. This depends upon the value of current being interrupted. I think a measure of pressures to be encountered, the specifications we use for these interrupter tubes, the interrupter tube before the port is cut out is required to pass a 4000 p.s.i. static hydraulic test. After the port has been cut, we block the ports by putting a suitable clamp over the outside. Obviously, by cutting the port we reduce the hoop strength of the assembly. In this condition, the interrupter chamber is required to pass a 2000 p.s.i. hydrostatic test.

Q. What do you mean by p.s.i.?

A. Pounds per square inch.

481 Q. What forces are generated in the pump shown in this model 70, Defendant's Exhibit 70, and as a white cylindrical tank?

A. The order of magnitude of two or three hundred p.s.i.

• • •

483 Mr. Van Santen. Your Honor, I offer into evidence Defendant's Exhibits 70-A through -D inclusive.

The Court: Is there any objection, counsel?

Mr. Smith: No objection, your Honor.

The Court: 70-A, -B, -C and -D are received.

• • •

By Mr. Van Santen:

Q. I hand the witness what has been marked for identification as Plaintiffs' [Defendant's] Exhibit 71 and I will ask you, Mr. Smith, if you will go through the illustrations depicted there in polarized animation and explain for the Court what is happening.

• • •

485 A. This is an animated artist's conception of how the breaker operates. It is not based on any movies, it is a conceptual type of approach.

In Figure 1 it shows the start of an interrupting action. The piston starts to move downward under the influence of the springs. At the same time the contacts start in the interrupter and it starts to move down under the influence of these springs. They are coupled mechanically at the top.

An arc is drawn at this point, generating pressure in the top chamber. Also a jet starts to move from the pump towards the interrupter chamber.

In Figure 2 we are showing a high current interrup-
486 tion, and this is illustrative of what will happen when both ports are fully active. That the output of the nozzle is being deflected away by the high volume release of gas, and vaporized oil from the interrupter chamber. There is a certain amount of cooling action, as our literature says, due to this jet impinging upon the exhaust products.

Q. In connection with that phase of the operation, what are the relative pressures in the interrupter, and as developed by the pump?

A. Well, we will have to distinguish between developed by the pump and impact pressure.

The pump develops a pressure approximately twice the impact pressure that is delivered at the port. These numbers are in one of the exhibits, and don't hold me to the exact values. As I recall the impact pressures at the time of interruption, a high current shot, would be somewhere of the order of magnitude, it would be 50 p.s.i., and the pressure inside the chamber would be of the order of magnitude of, oh, anywhere from 500 p.s.i. up.

Going to Step 3, this is what we envision happens after the arc goes out—

487 Q. I think you omitted Step 2?

A. No, Step 2 is a low current interruption. You go like so, and you go up.

Q. Oh, I see, all right—

A. So, this is what happens after the current as we envision happens after the current goes out, that the oil

flow flushes through the chamber, cleaning out the exhaust products and exhausting them through the far port.

• • •

488 By The Witness:

A. The crest of pressure detected within the chamber occurs after the period, the arcing period. The crest of impact pressure.

Going through a low current interruption, we get into a situation that is halfway between what would happen if we interrupted no current, just opened the breaker, in which case the oil would just flush through, and what happens when we have a high current interruption. At intermediate values we get into a halfway, in-between situation, where the pressure generated within the interrupter, due to the arc, counters the impact pressure of the jet coming towards the port and we get into a quasi-balance situation where some of the oil will penetrate partially from the jet, some of it will be flushed outward. This balance depends upon what value of current is being interrupted.

489 The Court: It is apparently desirable to maintain some degree of unvented or unported pressure within the interrupter chamber on a low current interruption, is that right—in other words, you don't want the port, the interrupter chamber as freely vented in a low current interruption as you necessarily must have it at a high current?

The Witness: That is correct, your Honor.

If you design interrupter chambers for high current interruption, it must be quite freely vented. For lower currents it is desirable to have a lesser degree of venting. Also at very low currents this acts as a, well, as a true puffer type of action.

The Court: It closes one port, in effect?

The Witness: Partially.

• • •

511 Q. Now, do your interrupters, Model AHJ and HF, control the pressure in the arc chamber as a function of the impact pressure in the oil stream?

A. No, they do not.

Q. How about at high interrupting current values?

A. No.

Q. Do you have an explanation for that?

A. Well, at high interrupting pressures, the pressure is an order of magnitude higher than the impact pressure, or close to it. The self-generating pressure completely overwhelms the impact pressure applied at the port, and diverts it into the cool oil in the tank.

Q. How about at low interrupting current values?

A. It doesn't control the pressure, no.

Q. Where?

A. In the arc chamber.

Q. And why is that?

A. Just the pressure in the arc chamber, as illustrated by these tests, does not build up due to the impact pressure.

Any pressure that is in the arc chamber is due to the
512 self-generation of the arc.

• • •

523 Q. What is the theory of interruption used in the HF-36 breaker? I mean the interrupting principle. I do not want a long speech. I just want the interrupting principle.

A. Well, to put it as briefly as possible, the fundamental interrupting principle is that of a suicide, self-energizing type interrupter. The arc energy is used to extinguish the arc. This is supplemented by transverse jets to assist in extinguishing low current values.

• • •

527 CROSS EXAMINATION

By Mr. Smith:

Q. I will show you Plaintiffs' Exhibit 51 for identification at this point, and ask you if you are the author of
528 this publication which is headed "Today's Design Trends, Optimize OCB Interrupter by Varying its Exhaust Area."

I might remind you that it says on the heading, "W. J. Smith," and it identifies W. J. Smith as being with McGraw-Edison.

A. Yes, I'm the author of that article.

• • •

529 Q. I am referring you, Mr. Smith, to the brochure on the HF-36 oil circuit breaker, which I have just previously identified, and in the August 1966 edition I note the paragraph reading:

530 "The jetstream system of arc interruption in the HF-36 breaker provides fast, efficient interruption of both high and low current level faults, and makes possible reliable, high-speed reclosing."

Is that a true fact?

A. Yes.

531 Q. Then you agree with that?

A. Yes.

Mr. Pendelton: What was the answer?

The Witness: Yes.

By Mr. Smith:

Q. Did I hear an answer? Do you agree with that?

A. I agree with the statement that is made in the brochure.

Q. Right.

Now, in this same brochure I find paragraphs reading and discussing interrupting low current faults and interrupting high current faults. In respect to high current faults, you speak of the oil jets being forced back from the interrupter. Is that correct?

A. I did not write that document.

Q. I did not ask you whether you wrote it or not. I asked you whether it was correct or not.

A. To the best of my knowledge, it is a correct statement, our best interpretation of how the interrupter works.

• • •

539 Q. Your brochure, with respect to the HF circuit breaker says,

"That for interrupting low current faults, the coordination of the oil jet action and the exhaust port design, aid in consistency of interruption, of both low and high currents—excuse me, high current values."

to quote your brochure, is that correct?

A. You're reading from the brochure.

Q. I am reading from the brochure that your company markets, sir.

A. I assume you are reading correctly.

Q. I will let you read it yourself if you would like to read it, and I will show you here where I read it from.

Did I misread it?

A. No.

Q. Then the statement as I read is true, is that right?

A. The test results indicate that the statement is true.

Q. Now, your same brochure on the HF-36, says,

"That at high current values the oil jets are forced
540 back from the interrupter ports by the high velocity exhausts from the chambers. But the intermixing of the cool oil from the jets, with the hot vaporized exhausts, creates a highly beneficial condensing action."

To show you that I have read correctly, I will let you read it too.

Is that statement correct?

A. To the best of my knowledge it is.

• • •

Q. Maybe you could follow me, Mr. Smith, on this.
541 I am handing you exhibit, Plaintiffs' Exhibit 23, which is in evidence, and I am referring now to page 1, and on the right-hand column you say,

"The jet stream system of arc interruption in the AHJ oil circuit breaker was designed to provide fast efficient interruption of both high and low current level faults, and makes possible reliable high speed reclosing."

Is that a fact?

A. The breaker so performs.

Q. And that is a true statement then, again?

Mr. Pendleton: Answer, please.

By The Witness:

A. Yes.

• • •

608 The Court: This is a convenient time. Before we adjourn, though, I would like to ask the witness one or two questions.

Mr. Smith: Certainly.

The Court: Mr. Smith, you testified earlier concerning what were described to you as Defendant's Exhibits 60 and 61, which were engineering tests reports, one indicating
609 pump pressure tests on HF-48 and the other interruption tests with and without pump on HF-36.

I want to ask you a question or two about those. Are you familiar with the exhibits I am referring to?

The Witness: Yes, your Honor.

The Court: All right.

When, if you know, did these first come to your attention? I will give them to you so you can note them. They bear dates in 1966.

The Witness: Defendant's Exhibit 60, type HF-36, 69 KV frame mounted oil circuit breaker prototype, these tests were conducted under my instruction.

The Court: I presume, then, that shortly after they were completed the reports came to your attention.

The Witness. Yes, your Honor.

The Court: Do you know or did you see any similar tests of the characteristics of the two circuit breakers involved at any earlier date? Were there any in the files or did
610 any come to your attention before you ordered these two?

The Witness: Let's talk about 60 first.

The Court: All right.

The Witness: The answer is no, I know of no other tests of this type previously made.

The other report, Defendant's Exhibit No. 61, is a two-part report. The first part predates my arrival at McGraw-Edison. The second part was conducted at my instruction.

The Court: At the time that these reports were ordered or these tests were ordered or requested by you, were the circuit breakers involved in production and being sold?

The Witness: On the HF-36, my predecessor had reported a successful design, and tooling was in progress. There had been no breakers shipped to users.

The Court: Do you remember on the other one?

The Witness: The other one dealt with the HF-48, which was a single pole prototype frame-mounted arrange-
611 ment, and it was still in the development stage.

The Court: Now, had these tests come to your attention and were they known to you at the time that you made the revisions or notes on the product data sheets? The original one has been identified as Plaintiffs' 20-A, and the one which I will call the revised one, which you testified from, I believe is 20B, Plaintiffs' 20B.

Were you familiar with the test data at the time you made those revisions? If you need these to look at, you may have them.

The Witness. I am trying to recall, your Honor.

The Court: The date on the product data sheet that I have in hand, Exhibit 20-A, is June of 1965.

Mr. Smith: I can hand him my copy, your Honor, if you would like to keep yours.

The Witness: I can't say for sure. I think they probably were.

The Court: You think they had come to your atten-
612 tion or you had seen them by that time?

The Witness: Yes, your Honor. I do not recall the date on which I marked the product data sheet.

The Court: Did you, in your capacity with McGraw-Edison at the time of the issuance of the August, 1966 catalog on HF-36 oil circuit breakers, which is Defendant's Exhibit 9 and Plaintiffs' Exhibit 24, have responsibility for approving the content of the catalog before it was issued?

The Witness: Not direct responsibility.

The Court: You did not actually proofread it or authorize its issuance?

The Witness: Not proof-read it. The marketing department would generate such a document, and it would be reviewed prior to issuance to be sure there were no glaring errors. This is about what it amounts to.

• • •